

2024 CFA[®]

Exam Prep

SchweserNotes[™]

Portfolio Management (Part One) and
Corporate Issuers

LEVEL I BOOK 2

KAPLAN SCHWESER

Book 2: Portfolio Management (Part One) and Corporate Issuers

SchweserNotes™ 2024

Level I CFA®



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Published in 2023 by Kaplan, Inc.

ISBN: 978-1-0788-3537-4

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LEARNING OUTCOME STATEMENTS (LOS)

20. Portfolio Risk and Return: Part I

The candidate should be able to:

- a. describe characteristics of the major asset classes that investors consider in forming portfolios.
- b. explain risk aversion and its implications for portfolio selection.
- c. explain the selection of an optimal portfolio, given an investor's utility (or risk aversion) and the capital allocation line.
- d. calculate and interpret the mean, variance, and covariance (or correlation) of asset returns based on historical data.
- e. calculate and interpret portfolio standard deviation.
- f. describe the effect on a portfolio's risk of investing in assets that are less than perfectly correlated.
- g. describe and interpret the minimum-variance and efficient frontiers of risky assets and the global minimum-variance portfolio.

21. Portfolio Risk and Return: Part II

The candidate should be able to:

- a. describe the implications of combining a risk-free asset with a portfolio of risky assets.
- b. explain the capital allocation line (CAL) and the capital market line (CML).
- c. explain systematic and nonsystematic risk, including why an investor should not expect to receive additional return for bearing nonsystematic risk.
- d. explain return generating models (including the market model) and their uses.
- e. calculate and interpret beta.
- f. explain the capital asset pricing model (CAPM), including its assumptions, and the security market line (SML).
- g. calculate and interpret the expected return of an asset using the CAPM.
- h. describe and demonstrate applications of the CAPM and the SML.
- i. calculate and interpret the Sharpe ratio, Treynor ratio, M^2 , and Jensen's alpha.

22. Organizational Forms, Corporate Issuer Features, and Ownership

The candidate should be able to:

- a. compare the organizational forms of businesses.
- b. describe key features of corporate issuers.
- c. compare publicly and privately owned corporate issuers.

23. Investors and Other Stakeholders

The candidate should be able to:

- a. compare the financial claims and motivations of lenders and shareholders.
- b. describe a company's stakeholder groups and compare their interests.
- c. describe environmental, social, and governance factors of corporate issuers considered by investors.

24. Corporate Governance: Conflicts, Mechanisms, Risks, and Benefits

The candidate should be able to:

- a. describe the principal-agent relationship and conflicts that may arise between stakeholder groups.
- b. describe corporate governance and mechanisms to manage stakeholder relationships and mitigate associated risks.
- c. describe potential risks of poor corporate governance and stakeholder management and benefits of effective corporate governance and stakeholder management.

25. Working Capital and Liquidity

The candidate should be able to:

- a. explain the cash conversion cycle and compare issuers' cash conversion cycles.
- b. explain liquidity and compare issuers' liquidity levels.
- c. describe issuers' objectives and compare methods for managing working capital and liquidity.

26. Capital Investments and Capital Allocation

The candidate should be able to:

- a. describe types of capital investments.
- b. describe the capital allocation process, calculate net present value (NPV), internal rate of return (IRR), and return on invested capital (ROIC), and contrast their use in capital allocation.
- c. describe principles of capital allocation and common capital allocation pitfalls.
- d. describe types of real options relevant to capital investments.

27. Capital Structure

The candidate should be able to:

- a. calculate and interpret the weighted-average cost of capital for a company.
- b. explain factors affecting capital structure and the weighted-average cost of capital.
- c. explain the Modigliani–Miller propositions regarding capital structure.
- d. describe optimal and target capital structures.

28. Business Models

The candidate should be able to:

- a. describe key features of business models.
- b. describe various types of business models.

READING 20

PORTFOLIO RISK AND RETURN: PART I

MODULE 20.1: HISTORICAL RISK AND RETURN



Video covering
this content is
available online.

LOS 20.a: Describe characteristics of the major asset classes that investors consider in forming portfolios.

An examination of the returns and standard deviation of returns for the major investable asset classes supports the idea of a tradeoff between risk and return. Using U.S. data over the period 1926–2017 as an example, shown in Figure 20.1, small-capitalization stocks have had the greatest average returns and greatest risk over the period. T-bills had the lowest average returns and the lowest standard deviation of returns.

Figure 20.1: Risk and Return of Major Asset Classes in the United States (1926–2017)¹

Assets Class	Average Annual Return (Geometric Mean)	Standard Deviation (Annualized Monthly)
Small-cap stocks	12.1%	31.7%
Large-cap stocks	10.2%	19.8%
Long-term corporate bonds	6.1%	8.3%
Long-term government bonds	5.5%	9.9%
Treasury bills	3.4%	3.1%
Inflation	2.9%	4.0%

Results for other markets around the world are similar: asset classes with the greatest average returns also have the highest standard deviations of returns.

The annual nominal return on U.S. equities has varied greatly from year to year, ranging from losses greater than 40% to gains of more than 50%. We can approximate the real returns over the period by subtracting inflation. The asset class with the least risk, T-bills, had a real return of only approximately 0.5% over the period, while the approximate real return on U.S. large-cap stocks was 7.3%. Because annual inflation fluctuated greatly over the period, real returns have been much more stable than nominal returns.

Evaluating investments using expected return and variance of returns is a simplification because returns do not follow a normal distribution; distributions are negatively skewed, with greater kurtosis (fatter tails) than a normal distribution. The negative skew reflects a tendency towards large downside deviations, while the positive excess kurtosis reflects frequent extreme deviations on both the upside and

downside. These non-normal characteristics of skewness ($\neq 0$) and kurtosis ($\neq 3$) should be taken into account when analyzing investments.

Liquidity is an additional characteristic to consider when choosing investments because liquidity can affect the price and, therefore, the expected return of a security. Liquidity can be a major concern in emerging markets and for securities that trade infrequently, such as low-quality corporate bonds.



MODULE QUIZ 20.1

1. Liquidity is *most likely* a concern for:
 - A. emerging market stocks.
 - B. high-quality corporate bonds.
 - C. U.S. Treasuries.
2. Which of the following asset classes has historically had the highest returns and standard deviation of returns?
 - A. Small-cap stocks.
 - B. Large-cap stocks.
 - C. Long-term corporate bonds.

MODULE 20.2: RISK AVERSION



LOS 20.b: Explain risk aversion and its implications for portfolio selection.

Video covering this content is available online.

A **risk-averse** investor is simply one that dislikes risk (i.e., prefers less risk to more risk). Given two investments that have equal expected returns, a risk-averse investor will choose the one with less risk (standard deviation, σ). Financial models assume all investors are risk averse.

A **risk-seeking** (risk-loving) investor would actually prefer more risk to less and, given equal expected returns, would prefer the more risky investment. A **risk-neutral** investor would have no preference regarding risk and would therefore be indifferent between any two investments with equal expected returns.

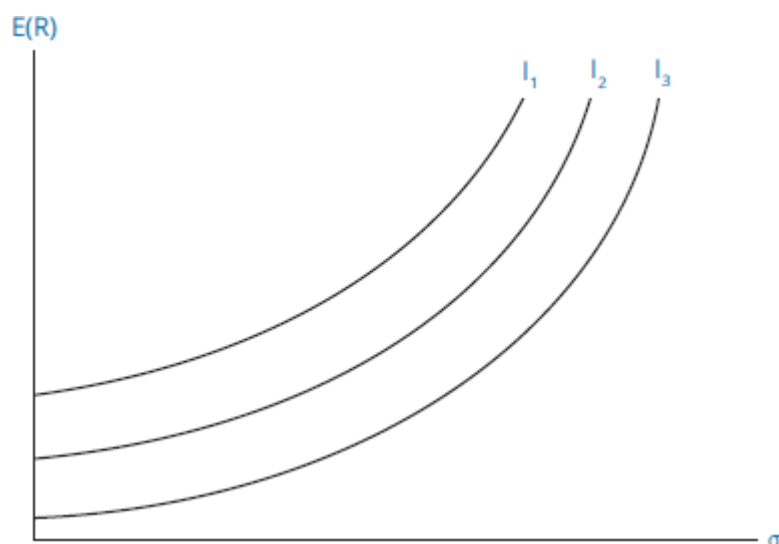
Consider this gamble: A coin will be flipped; if it comes up heads, you receive \$100; if it comes up tails, you receive nothing. The expected payoff is $0.5(\$100) + 0.5(\$0) = \$50$. A risk-averse investor would choose a payment of \$50 (a certain outcome) over the gamble. A risk-seeking investor would prefer the gamble to a certain payment of \$50. A risk-neutral investor would be indifferent between the gamble and a certain payment of \$50.

When the expected returns on two portfolios are equal, a risk-averse investor will always prefer the less risky portfolio. Those who choose high-risk portfolios feel that the increase in expected portfolio returns is adequate compensation for their portfolio's higher risk.

LOS 20.c: Explain the selection of an optimal portfolio, given an investor's utility (or risk aversion) and the capital allocation line.

Investors' **utility functions** represent their preferences regarding the tradeoff between risk and return (i.e., their degrees of risk aversion). An **indifference curve** is a tool from economics that, in this application, plots combinations of risk (standard deviation) and expected returns among which an investor is indifferent. In constructing indifference curves for portfolios based on only their expected return and standard deviation of returns, we are assuming that these are the only portfolio characteristics that investors care about. In Figure 20.2, we show three indifference curves for an investor. The investor's expected utility is the same for all points (portfolios) along any single indifference curve. Portfolios along indifference curve I_1 in Figure 20.2 are preferred to all portfolios along I_2 , which are preferred to all portfolios along I_3 .

Figure 20.2: Risk-Averse Investor's Indifference Curves



Indifference curves slope upward for risk-averse investors because they will only take on more risk (standard deviation of returns) if they are compensated with greater expected returns. An investor who is more risk averse requires a greater increase in expected return to compensate for a given increase in risk than a less risk-averse investor. In other words, the indifference curves of a more risk-averse investor will be steeper than those of a less risk-averse investor, reflecting a higher **risk aversion coefficient**.

In our previous illustration of efficient portfolios available in the market, we included only risky assets. Now we will introduce a risk-free asset into our universe of available assets, and we will examine the risk and return characteristics of a portfolio that combines a portfolio of risky assets and a risk-free asset. As we have seen, we can calculate the expected return and standard deviation of a portfolio with weight W_A allocated to risky Asset A and weight W_B allocated to risky Asset B using the following formulas:

$$E(R_{\text{portfolio}}) = W_A E(R_A) + W_B E(R_B)$$

$$\sigma_{\text{portfolio}} = \sqrt{W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B \rho_{AB} \sigma_A \sigma_B}$$

Allow Asset B to be the risk-free asset and Asset A to be the risky asset portfolio. Because a risk-free asset has zero standard deviation and zero correlation of returns with those of a risky portfolio, this results in the reduced equation:

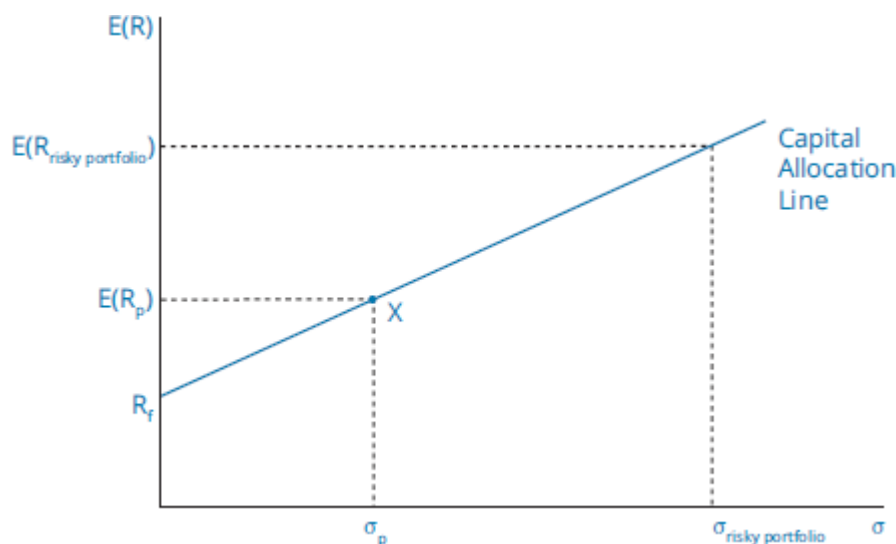
$$\sigma_{\text{portfolio}} = \sqrt{W_A^2 \sigma_A^2} = W_A \sigma_A$$

The intuition of this result is straightforward: If we put X% of our portfolio into the risky asset, and the rest into the risk-free asset, our portfolio will have X% of the risk of the risky asset. The relationship between portfolio risk and return for various portfolio allocations is linear, as illustrated in Figure 20.3.

Combining a risky portfolio with a risk-free asset is the process that supports the **two-fund separation theorem**, which states that all investors' optimal portfolios will be made up of some combination of the optimal portfolio of risky assets and the risk-free asset. The line representing these possible combinations of risk-free assets and the optimal risky asset portfolio is referred to as the **capital allocation line**.

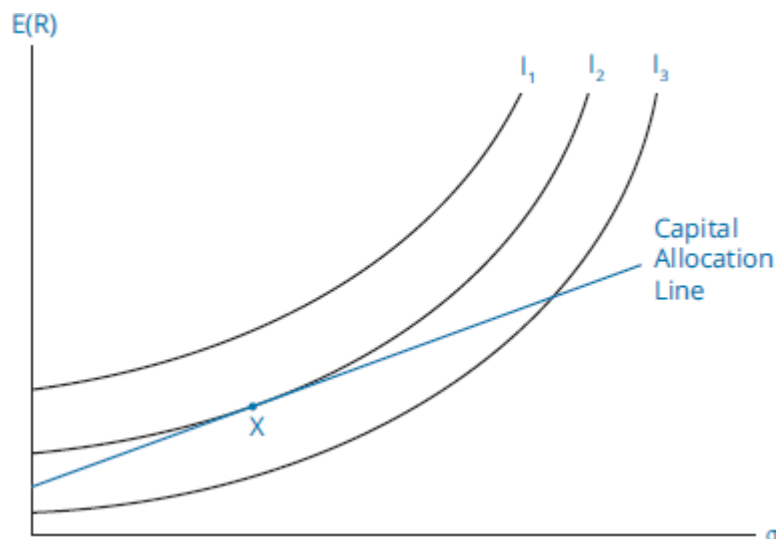
Point X on the capital allocation line in Figure 20.3 represents a portfolio that is 40% invested in the risky asset portfolio and 60% invested in the risk-free asset. Its expected return will be $0.40[E(R_{\text{risky asset portfolio}})] + 0.60(R_f)$, and its standard deviation will be $0.40 (\sigma_{\text{risky asset portfolio}})$.

Figure 20.3: Capital Allocation Line and Risky Asset Weights



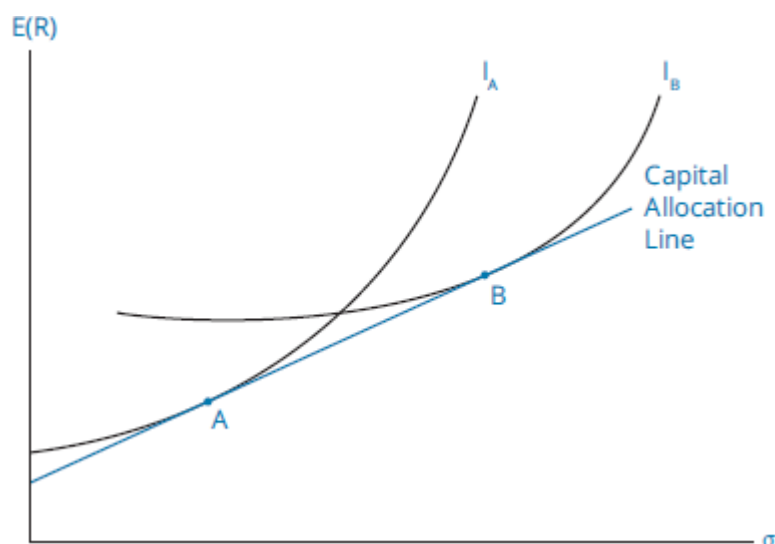
Now that we have constructed a set of the possible efficient portfolios (the capital allocation line), we can combine this with indifference curves representing an individual's preferences for risk and return to illustrate the logic of selecting an optimal portfolio (i.e., one that maximizes the investor's expected utility). In Figure 20.4, we can see that Investor A, with preferences represented by indifference curves I_1 , I_2 , and I_3 , can reach the level of expected utility on I_2 by selecting Portfolio X. This is the optimal portfolio for this investor, as any portfolio that lies on I_2 is preferred to all portfolios that lie on I_3 (and in fact to any portfolios that lie between I_2 and I_3). Portfolios on I_1 are preferred to those on I_2 , but none of the portfolios that lie on I_1 are available in the market.

Figure 20.4: Risk-Averse Investor's Indifference Curves



The final result of our analysis here is not surprising; investors who are less risk averse will select portfolios with more risk. Recall that the lower an investor's risk aversion, the flatter his indifference curves. As illustrated in Figure 20.5, the flatter indifference curve for Investor B (I_B) results in an optimal (tangency) portfolio that lies to the right of the one that results from a steeper indifference curve, such as that for Investor A (I_A). An investor who is less risk averse should optimally choose a portfolio with more invested in the risky asset portfolio and less invested in the risk-free asset.

Figure 20.5: Portfolio Choices Based on Two Investors' Indifference Curves



MODULE QUIZ 20.2

- Which of the following statements about risk-averse investors is *most accurate*? A risk-averse investor:
 - seeks out the investment with minimum risk, while return is not a major consideration.
 - will take additional investment risk if sufficiently compensated for this risk.
 - avoids participating in global equity markets.
- The capital allocation line is a line from the risk-free return through the:
 - global maximum-return portfolio.
 - optimal risky portfolio.
 - global minimum-variance portfolio.

MODULE 20.3: PORTFOLIO STANDARD DEVIATION



Video covering this content is available online.

LOS 20.d: Calculate and interpret the mean, variance, and covariance (or correlation) of asset returns based on historical data.

Variance (Standard Deviation) of Returns for an Individual Security

In finance, the variance and standard deviation of returns are common measures of investment risk. Both of these are measures of the variability of a distribution of returns about its mean or expected value.

We can calculate the population variance, σ^2 , when we know the return R_t for each period, the total number periods (T), and the mean or expected value of the population's distribution (μ), as follows:

$$\sigma^2 = \frac{\sum_{t=1}^T (R_t - \mu)^2}{T}$$

In the world of finance, we are typically analyzing only a sample of returns data, rather than the entire population. To calculate sample variance, s^2 , using a sample of T historical returns and the mean, \bar{R} , of the observations, we use the following formula:

$$s^2 = \frac{\sum_{t=1}^T (R_t - \bar{R})^2}{T - 1}$$

Covariance and Correlation of Returns for Two Securities

Covariance measures the extent to which two variables move together over time. A positive covariance means that the variables (e.g., rates of return on two stocks) tend to move together. Negative covariance means that the two variables tend to move in opposite directions. A covariance of zero means there is no linear relationship between the two variables. To put it another way, if the covariance of returns between two assets is zero, knowing the return for the next period on one of the assets tells you nothing about the return of the other asset for the period.

Here we will focus on the calculation of the covariance between two assets' returns using historical data. The calculation of the sample covariance is based on the following formula:

$$\text{Cov}_{1,2} = \frac{\sum_{t=1}^n \{ [R_{t,1} - \bar{R}_1] [R_{t,2} - \bar{R}_2] \}}{n - 1}$$

where:

$R_{t,1}$ = return on Asset 1 in period t

$R_{t,2}$ = return on Asset 2 in period t

\bar{R}_1 = mean return on Asset 1

\bar{R}_2 = mean return on Asset 2

n = number of periods

The magnitude of the covariance depends on the magnitude of the individual stocks' standard deviations and the relationship between their co-movements. Covariance is an absolute measure and is measured in return units squared.

The covariance of the returns of two securities can be standardized by dividing by the product of the standard deviations of the two securities. This standardized measure of co-movement is called **correlation** and is computed as:

$$\rho_{1,2} = \frac{\text{Cov}_{1,2}}{\sigma_1 \sigma_2}$$

The relation can also be written as:

$$\text{Cov}_{1,2} = \rho_{1,2} \sigma_1 \sigma_2$$

The term $\rho_{1,2}$ is called the *correlation coefficient* between the returns of securities 1 and 2. The correlation coefficient has no units. It is a pure measure of the co-movement of the two stocks' returns and is bounded by -1 and +1.

How should you interpret the correlation coefficient?

- A correlation coefficient of +1 means that deviations from the mean or expected return are always proportional in the same direction. That is, they are perfectly positively correlated.
- A correlation coefficient of -1 means that deviations from the mean or expected return are always proportional in opposite directions. That is, they are perfectly negatively correlated.
- A correlation coefficient of zero means that there is no linear relationship between the two stocks' returns. They are uncorrelated. One way to interpret a correlation (or covariance) of zero is that, in any period, knowing the actual value of one variable tells you nothing about the value of the other.

EXAMPLE: Calculating mean return, returns variance, returns covariance, and correlation

Given three years of percentage returns for Assets A and B in the following table, calculate the mean return and sample standard deviation for each asset, the sample covariance, and the correlation of returns.

Year	Asset A	Asset B
1	5%	7%
2	-2%	-4%
3	12%	18%

Answer:

mean return for Asset A = $(5\% - 2\% + 12\%) / 3 = 5\%$

mean return for Asset B = $(7\% - 4\% + 18\%) / 3 = 7\%$

sample variance of returns for Asset A = $\frac{(5-5)^2 + (-2-5)^2 + (12-5)^2}{3-1}$
 $= 49$

sample standard deviation for Asset A = $\sqrt{49} = 7\%$

sample variance of returns for Asset B = $\frac{(7-7)^2 + (-4-7)^2 + (18-7)^2}{3-1}$
 $= 121$

sample standard deviation for Asset B = $\sqrt{121} = 11\%$

sample covariance of returns for Assets A and B

$= \frac{(5-5)(7-7) + (-2-5)(-4-7) + (12-5)(18-7)}{3-1} = 77$

correlation of returns for Assets A and B = $\frac{77}{7 \times 11} = 1$

In this example, the returns on Assets A and B are perfectly positively correlated.

LOS 20.e: Calculate and interpret portfolio standard deviation.



The variance of returns for a portfolio of two risky assets is calculated as follows:

Video covering this content is available online.

$$\text{Var}_{\text{portfolio}} = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \text{Cov}_{12}$$

where w_1 is the proportion of the portfolio invested in Asset 1, and w_2 is the proportion of the portfolio invested in Asset 2. w_2 must equal $(1 - w_1)$.

Previously, we established that the correlation of returns for two assets is calculated as:

$$\rho_{12} = \frac{\text{Cov}_{12}}{\sigma_1 \sigma_2}, \text{ so that we can also write } \text{Cov}_{12} = \rho_{12} \sigma_1 \sigma_2.$$

Substituting this term for Cov_{12} in the formula for the variance of returns for a portfolio of two risky assets, we have the following:

$$\text{Var}_{\text{portfolio}} = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2$$

Because $\text{Var}_{\text{portfolio}} = \sigma_{\text{portfolio}}^2$, this can also be written as:

$$\sigma_{\text{portfolio}} = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2}$$

Writing the formula in this form allows us to easily see the effect of the correlation of returns between the two assets on portfolio risk.

EXAMPLE: Calculating portfolio standard deviation

A portfolio is 30% invested in stocks that have a standard deviation of returns of 20% and is 70% invested in bonds that have a standard deviation of returns of 12%. The correlation of bond returns with stock returns is 0.60. What is the

standard deviation of portfolio returns? What would it be if stock and bond returns were perfectly positively correlated?

Answer:

portfolio standard deviation

$$= \sqrt{(0.3^2)(0.2^2) + (0.7^2)(0.12^2) + 2(0.3)(0.7)(0.6)(0.2)(0.12)}$$
$$= 12.9\%$$

If stock and bond returns were perfectly positively correlated, portfolio standard deviation would simply be the weighted average of the assets' standard deviations: $0.3(20\%) + 0.7(12\%) = 14.4\%$.



MODULE QUIZ 20.3

1. In a 5-year period, the annual returns on an investment are 5%, -3%, -4%, 2%, and 6%. The standard deviation of annual returns on this investment is *closest* to:
A. 4.0%.
B. 4.5%.
C. 20.7%.
2. A measure of how the returns of two risky assets move in relation to each other is the:
A. range.
B. covariance.
C. standard deviation.
3. Which of the following statements about correlation is *least accurate*?
A. Diversification reduces risk when correlation is less than +1.
B. If the correlation coefficient is 0, a zero-variance portfolio can be constructed.
C. The lower the correlation coefficient, the greater the potential benefits from diversification.
4. The variance of returns is 0.09 for Stock A and 0.04 for Stock B. The covariance between the returns of A and B is 0.006. The correlation of returns between A and B is:
A. 0.10.
B. 0.20.
C. 0.30.
5. A portfolio was created by investing 25% of the funds in Asset A (standard deviation = 15%) and the balance of the funds in Asset B (standard deviation = 10%). If the correlation coefficient is -0.75, what is the portfolio's standard deviation?
A. 2.8%.
B. 4.2%.
C. 5.3%.

MODULE 20.4: THE EFFICIENT FRONTIER



Video covering this content is available online.

LOS 20.f: Describe the effect on a portfolio's risk of investing in assets that are less than perfectly correlated.

If two risky asset returns are perfectly positively correlated, $\rho_{12} = +1$, then the square root of portfolio variance (the portfolio standard deviation of returns) is equal to:

$$\sigma_{\text{portfolio}} = \sqrt{\text{Var}_{\text{portfolio}}} = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_1\sigma_2(1)} = w_1\sigma_1 + w_2\sigma_2$$



PROFESSOR'S NOTE

This might be easier to see by examining the algebra in reverse. If $w_1\sigma_1 + w_2\sigma_2$ equals the square root of the term under the radical in this special case, then $(w_1\sigma_1 + w_2\sigma_2)^2$ should equal the term under the radical. If we expand $(w_1\sigma_1 + w_2\sigma_2)^2$, we get:

$$\begin{aligned} (w_1\sigma_1 + w_2\sigma_2)^2 &= (w_1\sigma_1)^2 + (w_1\sigma_1)(w_2\sigma_2) + (w_2\sigma_2)(w_1\sigma_1) + (w_2\sigma_2)^2 \\ &= (w_1\sigma_1)^2 + (w_2\sigma_2)^2 + 2(w_1\sigma_1)(w_2\sigma_2) \\ &= w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1\sigma_1w_2\sigma_2 \end{aligned}$$

In this unique case, with $\rho_{12} = 1$, the portfolio standard deviation is simply a weighted average of the standard deviations of the individual asset returns. A portfolio 25% invested in Asset 1 and 75% invested in Asset 2 will have a standard deviation of returns equal to 25% of the standard deviation (σ_1) of Asset 1's return, plus 75% of the standard deviation (σ_2) of Asset 2's return.

Focusing on returns correlation, we can see that the greatest portfolio risk results when the correlation between asset returns is +1. For any value of correlation less than +1, portfolio variance is reduced. Note that for a correlation of zero, the entire third term in the portfolio variance equation is zero. For negative values of correlation ρ_{12} , the third term becomes negative and further reduces portfolio variance and standard deviation.

We will illustrate this property with an example.

EXAMPLE: Portfolio risk as correlation varies

Consider two risky assets that have returns variances of 0.0625 and 0.0324, respectively. The assets' standard deviations of returns are then 25% and 18%, respectively. Calculate the variances and standard deviations of portfolio returns for an equal-weighted portfolio of the two assets when their correlation of returns is 1, 0.5, 0, and -0.5.

The calculations are as follows:

$$\text{variance}_{\text{portfolio}} = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2$$

$$\sigma_{\text{portfolio}} = \sqrt{\text{variance}_{\text{portfolio}}}$$

$$\sigma_{\text{portfolio}} = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2}$$

$\rho = \text{correlation} = +1$:

$$\sigma = \text{portfolio standard deviation} = 0.5(25\%) + 0.5(18\%) = 21.5\%$$

$$\sigma^2 = \text{portfolio variance} = 0.215^2 = 0.046225$$

$\rho = \text{correlation} = 0.5$:

$$\sigma^2 = (0.5^2)0.0625 + (0.5^2)0.0324 + 2(0.5)(0.5)(0.5)(0.25)(0.18) = 0.034975$$

$$\sigma = 18.70\%$$

$\rho = \text{correlation} = 0$:

$$\sigma^2 = (0.5^2)0.0625 + (0.5^2)0.0324 = 0.023725$$

$$\sigma = 15.40\%$$

$\rho = \text{correlation} = -0.5$:

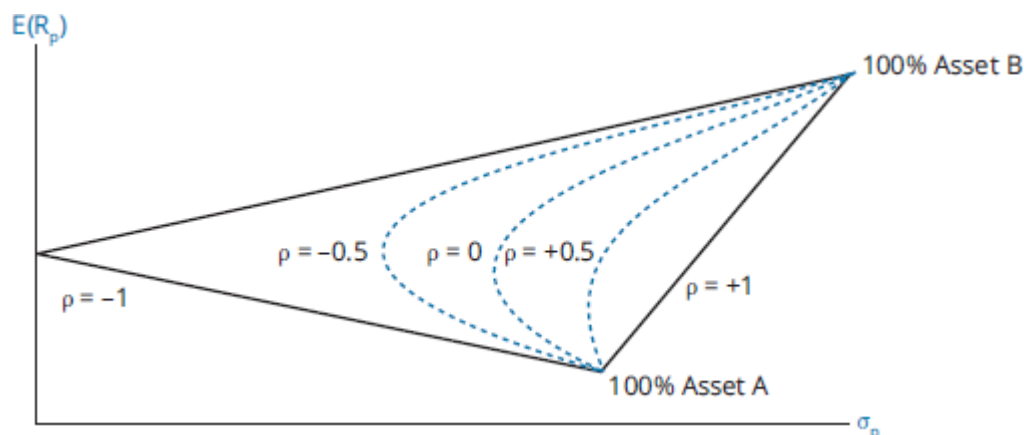
$$\sigma^2 = (0.5^2)0.0625 + (0.5^2)0.0324 + 2(0.5)(0.5)(-0.5)(0.25)(0.18) = 0.012475$$

$$\sigma = 11.17\%$$

Note that portfolio risk decreases as the correlation between the assets' returns decreases. This is an important result of the analysis of portfolio risk: The lower the correlation of asset returns, the greater the risk reduction (diversification) benefit of combining assets in a portfolio. If asset returns were perfectly negatively correlated, portfolio risk could be eliminated altogether for a specific set of asset weights.

We show these relations graphically in Figure 20.6 by plotting the portfolio risk and return for all portfolios of two risky assets, for specific values of the assets' returns correlation.

Figure 20.6: Risk and Return for Different Values of ρ



From these analyses, the risk reduction benefits of investing in assets with low return correlations should be clear. The desire to reduce risk is what drives investors to invest in not just domestic stocks, but also bonds, foreign stocks, real estate, and other asset classes.

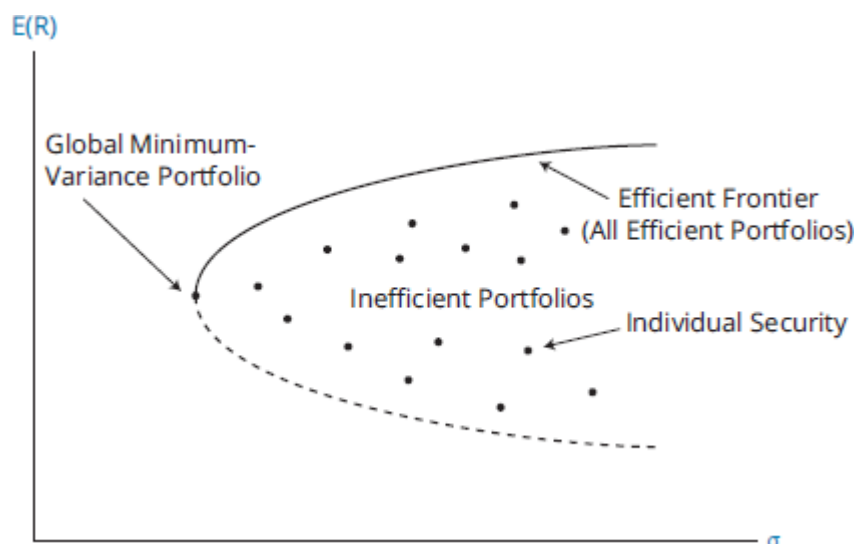
LOS 20.g: Describe and interpret the minimum-variance and efficient frontiers of risky assets and the global minimum-variance portfolio.

For each level of expected portfolio return, we can vary the portfolio weights on the individual assets to determine the portfolio that has the least risk. These portfolios that have the lowest standard deviation of all portfolios with a given expected return are known as **minimum-variance portfolios**. Together they make up the **minimum-variance frontier**.

Assuming that investors are risk averse, investors prefer the portfolio that has the greatest expected return when choosing among portfolios that have the same standard deviation of returns. Those portfolios that have the greatest expected return for each level of risk (standard deviation) make up the **efficient frontier**. The efficient frontier coincides with the top portion of the minimum-variance frontier. A risk-averse investor would only choose portfolios that are on the efficient frontier because all available portfolios that are not on the efficient frontier have lower expected returns than an efficient portfolio with the same risk. The portfolio on the efficient frontier that has the least risk is the **global minimum-variance portfolio**.

These concepts are illustrated in Figure 20.7.

Figure 20.7: Minimum-Variance and Efficient Frontiers



MODULE QUIZ 20.4

1. Which of the following statements about covariance and correlation is *least accurate*?
 - A. A zero covariance implies there is no linear relationship between the returns on two assets.
 - B. If two assets have perfect negative correlation, the variance of returns for a portfolio that consists of these two assets will equal zero.

C. The covariance of a 2-stock portfolio is equal to the correlation coefficient times the standard deviation of one stock's returns times the standard deviation of the other stock's returns.

2. Which of the following available portfolios *most likely* falls below the efficient frontier?

	<u>Portfolio</u>	<u>Expected return</u>	<u>Expected standard deviation</u>
A.	A	7%	14%
B.	B	9%	26%
C.	C	12%	22%

KEY CONCEPTS

LOS 20.a

As predicted by theory, asset classes with the greatest average returns have also had the highest risk.

Some of the major asset classes that investors consider when building a diversified portfolio include small-capitalization stocks, large-capitalization stocks, long-term corporate bonds, long-term Treasury bonds, and Treasury bills.

In addition to risk and return, when analyzing investments, investors also take into consideration an investment's liquidity, as well as non-normal characteristics such as skewness and kurtosis.

LOS 20.b

A risk-averse investor is one that dislikes risk. Given two investments that have equal expected returns, a risk-averse investor will choose the one with less risk. However, a risk-averse investor will hold risky assets if he feels that the extra return he expects to earn is adequate compensation for the additional risk. Assets in the financial markets are priced according to the preferences of risk-averse investors.

A risk-seeking (risk-loving) investor prefers more risk to less and, given investments with equal expected returns, will choose the more risky investment.

A risk-neutral investor would be indifferent to risk and would be indifferent between two investments with the same expected return regardless of the investments' standard deviation of returns.

LOS 20.c

An indifference curve plots combinations of risk and expected return that provide the same expected utility. Indifference curves for risk and return slope upward because risk-averse investors will only take on more risk if they are compensated with greater expected returns. A more risk-averse investor will have steeper indifference curves.

Flatter indifference curves (less risk aversion) result in an optimal portfolio with higher risk and higher expected return. An investor who is less risk averse will optimally choose a portfolio with more invested in the risky asset portfolio and less invested in the risk-free asset, compared to a more risk-averse investor.

LOS 20.d

We can calculate the population variance, σ^2 , when we know the return R_t for period t , the total number T of periods, and the mean μ of the population's distribution:

$$\text{population variance} = \sigma^2 = \frac{\sum_{t=1}^T (R_t - \mu)^2}{T}$$

In finance, we typically analyze only a sample of returns, so the sample variance applies instead:

$$\text{sample variance} = S^2 = \frac{\sum_{t=1}^T (R_t - \bar{R})^2}{T - 1}$$

Covariance measures the extent to which two variables move together over time. Positive covariance means the variables (e.g., rates of return on two stocks) tend to move together. Negative covariance means that the two variables tend to move in opposite directions. Covariance of zero means there is no linear relationship between the two variables.

Correlation is a standardized measure of co-movement that is bounded by -1 and +1:

$$\rho_{1,2} = \frac{\text{Cov}_{1,2}}{\sigma_1 \sigma_2}$$

LOS 20.e

The standard deviation of returns for a portfolio of two risky assets is calculated as follows:

$$\sigma_{\text{portfolio}} = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{1,2} \sigma_1 \sigma_2}$$

LOS 20.f

The greatest portfolio risk will result when the asset returns are perfectly positively correlated. As the correlation decreases from +1 to -1, portfolio risk decreases. The lower the correlation of asset returns, the greater the risk reduction (diversification) benefit of combining assets in a portfolio.

LOS 20.g

For each level of expected portfolio return, the portfolio that has the least risk is known as a minimum-variance portfolio. Taken together, these portfolios form a line called the minimum-variance frontier.

On a risk versus return graph, the one risky portfolio that is farthest to the left (has the least risk) is known as the global minimum-variance portfolio.

Those portfolios that have the greatest expected return for each level of risk make up the efficient frontier. The efficient frontier coincides with the top portion of the minimum variance frontier. Risk-averse investors would only choose a portfolio that lies on the efficient frontier.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 20.1

- 1. A** Liquidity can be a concern for emerging market stocks and for securities that trade infrequently, such as low-quality corporate bonds. U.S. Treasuries exhibit high degrees of liquidity. (LOS 20.a)

2. **A** Small-cap stocks have had the highest annual return and standard deviation of return over time. Large-cap stocks and bonds have historically had lower risk and return than small-cap stocks. (LOS 20.a)

Module Quiz 20.2

1. **B** Risk-averse investors are generally willing to invest in risky investments, if the expected return of the investment is sufficient to reward the investor for taking on this risk. Participants in securities markets are generally assumed to be risk-averse investors. (LOS 20.b)
2. **B** An investor's optimal portfolio will lie somewhere on the capital allocation line, which begins at the risk-free asset and runs through the optimal risky portfolio. (LOS 20.c)

Module Quiz 20.3

1. **B** mean annual return = $(5\% - 3\% - 4\% + 2\% + 6\%) / 5 = 1.2\%$

Squared deviations from the mean:

$$5\% - 1.2\% = 3.8\% \quad 3.8^2 = 14.44$$

$$-3\% - 1.2\% = -4.2\% \quad -4.2^2 = 17.64$$

$$-4\% - 1.2\% = -5.2\% \quad -5.2^2 = 27.04$$

$$2\% - 1.2\% = 0.8\% \quad 0.8^2 = 0.64$$

$$6\% - 1.2\% = 4.8\% \quad 4.8^2 = 23.04$$

$$\text{sum of squared deviations} = 14.44 + 17.64 + 27.04 + 0.64 + 23.04 = 82.8$$

$$\text{sample variance} = 82.8 / (5 - 1) = 20.7$$

$$\text{sample standard deviation} = 20.7^{1/2} = 4.55\%$$

(LOS 20.d)

2. **B** The covariance is defined as the co-movement of the returns of two assets or how well the returns of two risky assets move together. Range and standard deviation are measures of dispersion and measure risk, not how assets move together. (LOS 20.d)
3. **B** A zero-variance portfolio can only be constructed if the correlation coefficient between assets is -1. Diversification benefits can be had when correlation is less than +1, and the lower the correlation, the greater the expected benefit. (LOS 20.d)

4. **A** $\sqrt{A} = \sqrt{0.09} = 0.30$

$$\sqrt{B} = \sqrt{0.04} = 0.20$$

$$\text{correlation} = 0.006 / [(0.30)(0.20)] = 0.10$$

(LOS 20.d)

5. **C**
$$\sqrt{(0.25)^2(0.15)^2 + (0.75)^2(0.10)^2 + 2(0.25)(0.75)(0.15)(0.10)(-0.75)} =$$

$$\sqrt{0.001406 + 0.005625 - 0.004219} = \sqrt{0.002812} = 0.053 = 5.3\%$$

(LOS 20.e)

Module Quiz 20.4

1. **B** If the correlation of returns between the two assets is -1, the set of possible portfolio risk/return combinations becomes two straight lines (see Figure 20.6). A portfolio of these two assets will have a positive returns variance unless the portfolio weights are those that minimize the portfolio variance. Covariance is equal to the correlation coefficient multiplied by the product of the standard deviations of the returns of the two stocks in a 2-stock portfolio. If covariance is zero, then correlation is also zero, which implies that there is no linear relationship between the two stocks' returns. (LOS 20.f)
2. **B** Portfolio B must be the portfolio that falls below the Markowitz efficient frontier because there is a portfolio (Portfolio C) that offers a higher return and lower risk. (LOS 20.g)

¹ 2018 SBBI Yearbook.

READING 21

PORTFOLIO RISK AND RETURN: PART II

MODULE 21.1: SYSTEMATIC RISK AND BETA



Video covering
this content is
available online.

LOS 21.a: Describe the implications of combining a risk-free asset with a portfolio of risky assets.

In the previous reading, we covered the mathematics of calculating the risk and return of a portfolio with a percentage weight of W_A invested in a risky portfolio (P) and a weight of $W_B = 1 - W_A$ invested in a risk-free asset.

$$E(R_P) = W_A E(R_A) + W_B E(R_B)$$

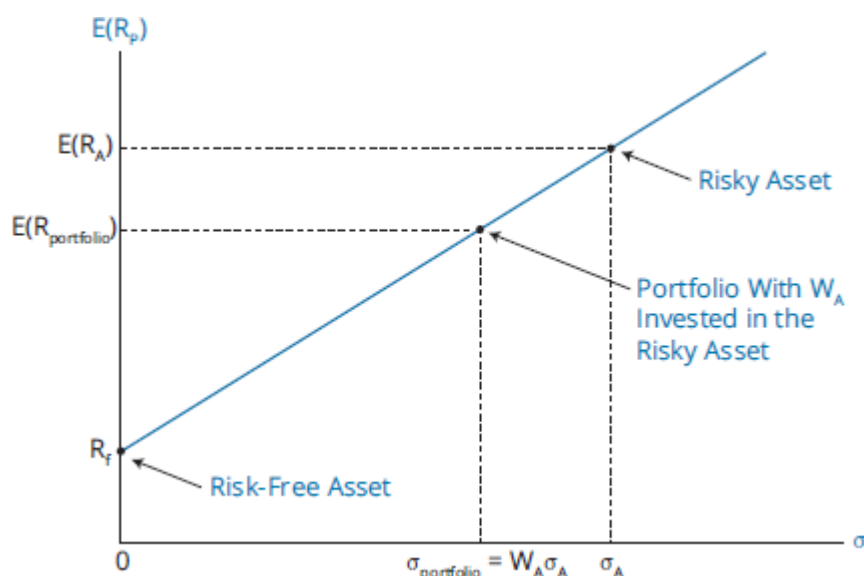
$$\sigma_P = \sqrt{W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B \rho_{AB} \sigma_A \sigma_B}$$

Because a risk-free asset has zero standard deviation and zero correlation of returns with a risky portfolio, allowing Asset B to be the risk-free asset and Asset A to be the risky asset portfolio results in the following reduced equation:

$$\sigma_P = \sqrt{W_A^2 \sigma_A^2} = W_A \sigma_A$$

Our result is that the risk (standard deviation of returns) and expected return of portfolios with varying weights in the risk-free asset and a risky portfolio can be plotted as a line that begins at the risk-free rate of return and extends through the risky portfolio. This result is illustrated in Figure 21.1.

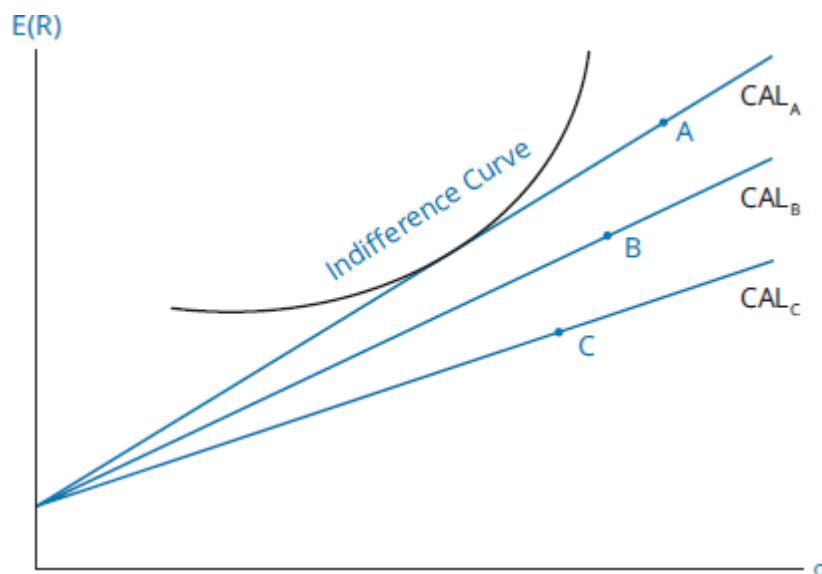
Figure 21.1: Combining a Risk-Free Asset With a Risky Asset



LOS 21.b: Explain the capital allocation line (CAL) and the capital market line (CML).

The line of possible portfolio risk and return combinations given the risk-free rate and the risk and return of a portfolio of risky assets is referred to as the **capital allocation line (CAL)**. For an individual investor, the best CAL is the one that offers the most-preferred set of possible portfolios in terms of their risk and return. Figure 21.2 illustrates three possible investor CALs for three different risky Portfolios A, B, and C. The optimal risky portfolio for this investor is Portfolio A because it results in the most preferred set of possible portfolios constructed by combining the risk-free asset with the risky portfolio. Of all the portfolios available to the investor, a combination of the risk-free asset with risky Portfolio A offers the investor the greatest expected utility.

Figure 21.2: Risky Portfolios and Their Associated Capital Allocation Lines



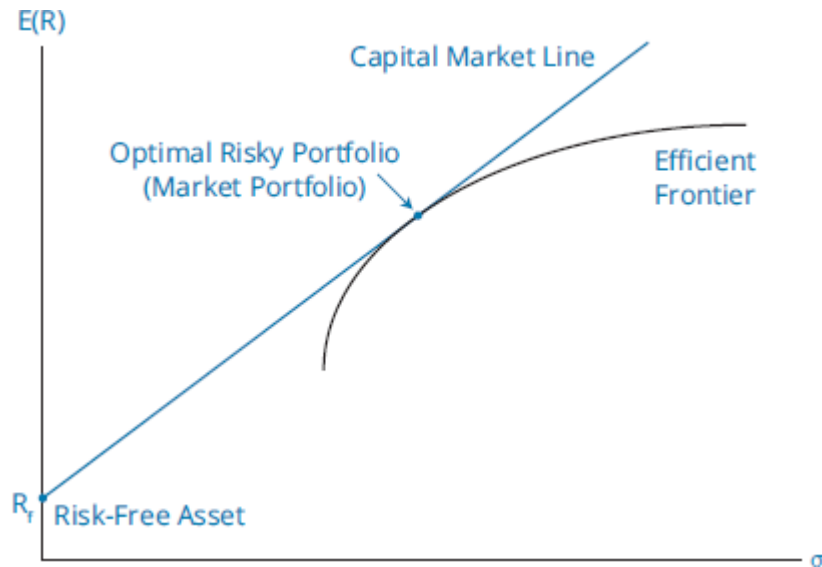
If each investor has different expectations about the expected returns of, standard deviations of, or correlations between risky asset returns, each investor will have a different optimal risky asset portfolio and a different CAL.

A simplifying assumption underlying modern portfolio theory (and the capital asset pricing model, which is introduced later in this reading) is that investors have homogeneous expectations (i.e., they all have the same estimates of risk, return, and correlations with other risky assets for all risky assets). Under this assumption, all investors face the same efficient frontier of risky portfolios and will all have the same optimal risky portfolio and CAL.

Figure 21.3 illustrates the determination of the optimal risky portfolio and optimal CAL for all investors under the assumption of homogeneous expectations. Note that, under this assumption, the optimal CAL for any investor is the one that is just tangent to the efficient frontier. Depending on their preferences for risk and return (their indifference curves), investors may choose different portfolio weights for the risk-free asset and the risky (tangency) portfolio. Every investor, however, will use the same risky portfolio. When this is the case, that portfolio must be the **market**

portfolio of all risky assets because all investors that hold any risky assets hold the same portfolio of risky assets.

Figure 21.3: Determining the Optimal Risky Portfolio and Optimal CAL Assuming Homogeneous Expectations



Under the assumption of homogeneous expectations, this optimal CAL for all investors is termed the **capital market line (CML)**. Along this line, expected portfolio return, $E(R_p)$, is a linear function of portfolio risk, σ_p . The equation of this line is as follows:

$$E(R_p) = R_f + \left(\frac{E(R_M) - R_f}{\sigma_M} \right) \sigma_p$$

The y-intercept of this line is R_f and the slope (rise over run) of this line is as follows:

$$\left(\frac{E(R_M) - R_f}{\sigma_M} \right)$$

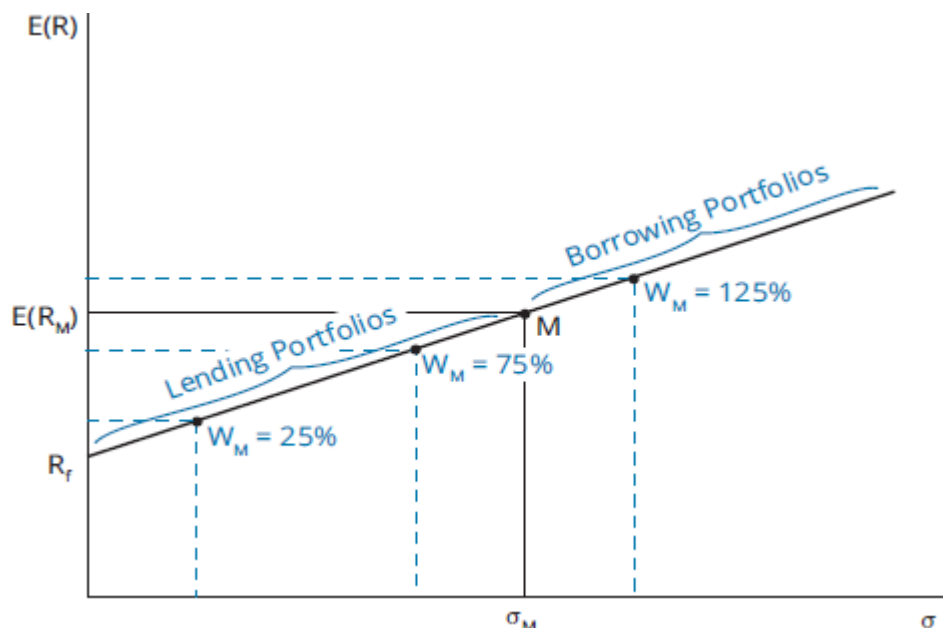
The intuition of this relation is straightforward. An investor who chooses to take on no risk ($\sigma_p = 0$) will earn the risk-free rate, R_f . The difference between the expected return on the market and the risk-free rate is termed the **market risk premium**. If we rewrite the CML equation as

$$E(R_p) = R_f + (E(R_M) - R_f) \left(\frac{\sigma_p}{\sigma_M} \right)$$

we can see that an investor can expect to get one unit of market risk premium in additional return (above the risk-free rate) for every unit of market risk, σ_M , that the investor is willing to accept.

If we assume that investors can both lend (invest in the risk-free asset) at the risk-free rate and borrow (as with a margin account) at the risk-free rate, they can select portfolios to the right of the market portfolio, as illustrated in Figure 21.4.

Figure 21.4: Borrowing and Lending Portfolios



Investors who believe market prices are informationally efficient often follow a **passive investment strategy** (i.e., invest in an index of risky assets that serves as a proxy for the market portfolio and allocate a portion of their investable assets to a risk-free asset, such as short-term government securities). In practice, many investors and portfolio managers believe their estimates of security values are correct and market prices are incorrect. Such investors will not use the weights of the market portfolio but will invest more than the market weights in securities that they believe are undervalued and less than the market weights in securities which they believe are overvalued. This is referred to as **active portfolio management** to differentiate it from a passive investment strategy that utilizes a market index for the optimal risky asset portfolio.

LOS 21.c: Explain systematic and nonsystematic risk, including why an investor should not expect to receive additional return for bearing nonsystematic risk.

When an investor diversifies across assets that are not perfectly correlated, the portfolio's risk is less than the weighted average of the risks of the individual securities in the portfolio. The risk that is eliminated by diversification is called **unsystematic risk** (also called *unique, diversifiable, or firm-specific risk*). Because the market portfolio contains *all* risky assets, it must be a well-diversified portfolio. All the risk that can be diversified away has been. The risk that remains cannot be diversified away and is called the **systematic risk** (also called *nondiversifiable risk or market risk*).

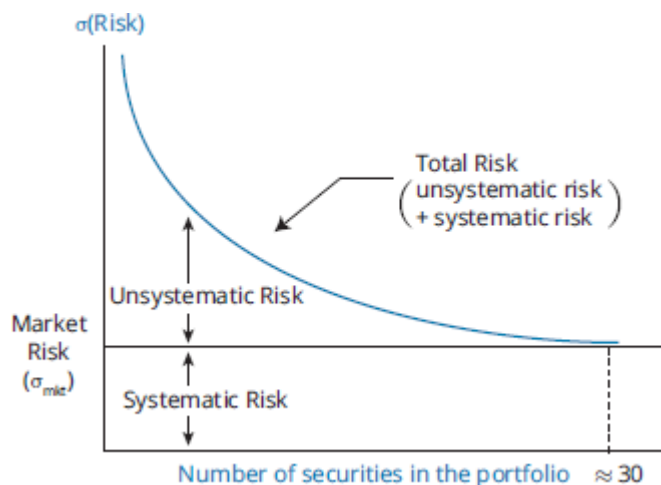
The concept of systematic risk applies to individual securities as well as to portfolios. Some securities' returns are highly correlated with overall market returns. Examples of firms that are highly correlated with market returns are luxury goods manufacturers such as Ferrari automobiles and Harley Davidson motorcycles. These firms have high systematic risk (i.e., they are very responsive to market, or systematic, changes). Other firms, such as utility companies, respond very little to changes in the systematic risk factors. These firms have very little systematic risk.

Hence, total risk (as measured by standard deviation) can be broken down into its component parts: unsystematic risk and systematic risk. Mathematically:

$$\text{total risk} = \text{systematic risk} + \text{unsystematic risk}$$

Do you actually have to buy all the securities in the market to diversify away unsystematic risk? No. Academic studies have shown that as you increase the number of stocks in a portfolio, the portfolio's risk falls toward the level of market risk. One study showed that it only took about 12 to 18 stocks in a portfolio to achieve 90% of the maximum diversification possible. Another study indicated it took 30 securities. Whatever the number, it is significantly less than *all* the securities. Figure 21.5 provides a general representation of this concept. Note, in the figure, that once you get to 30 or so securities in a portfolio, the standard deviation remains constant. The remaining risk is systematic, or nondiversifiable, risk. We will develop this concept later when we discuss beta, a measure of systematic risk.

Figure 21.5: Risk vs. Number of Portfolio Assets



Systematic Risk Is Relevant in Portfolios

One important conclusion of capital market theory is that equilibrium security returns depend on a stock's or a portfolio's systematic risk, not its total risk as measured by standard deviation. One of the assumptions of the model is that diversification is free. The reasoning is that investors will not be compensated for bearing risk that can be eliminated at no cost. If you think about the costs of a no-load index fund compared to buying individual stocks, diversification is actually very low cost if not actually free.

The implications of this conclusion are very important to asset pricing (expected returns). The riskiest stock, with risk measured as standard deviation of returns, does not necessarily have the greatest expected return. Consider a biotech stock with one new drug product that is in clinical trials to determine its effectiveness. If it turns out that the drug is effective and safe, stock returns will be quite high. If, on the other hand, the subjects in the clinical trials are killed or otherwise harmed by the drug, the stock will fall to approximately zero and returns will be quite poor. This describes a stock with high standard deviation of returns (i.e., high total risk).

The high risk of our biotech stock, however, is primarily from firm-specific factors, so its unsystematic risk is high. Because market factors such as economic growth

rates have little to do with the eventual outcome for this stock, systematic risk is a small proportion of the total risk of the stock. Capital market theory says that the equilibrium return on this stock may be less than that of a stock with much less firm-specific risk but more sensitivity to the factors that drive the return of the overall market. An established manufacturer of machine tools may not be a very risky investment in terms of total risk, but may have a greater sensitivity to market (systematic) risk factors (e.g., GDP growth rates) than our biotech stock. Given this scenario, the stock with more total risk (the biotech stock) has less systematic risk and will therefore have a lower equilibrium rate of return according to capital market theory.

Note that holding many biotech firms in a portfolio will diversify away the firm-specific risk. Some will have blockbuster products and some will fail, but you can imagine that when 50 or 100 such stocks are combined into a portfolio, the uncertainty about the portfolio return is much less than the uncertainty about the return of a single biotech firm stock.

To sum up, unsystematic risk is not compensated in equilibrium because it can be eliminated for free through diversification. Systematic risk is measured by the contribution of a security to the risk of a well-diversified portfolio, and the expected equilibrium return (required return) on an individual security will depend only on its systematic risk.

LOS 21.d: Explain return generating models (including the market model) and their uses.

Return generating models are used to estimate the expected returns on risky securities based on specific factors. For each security, we must estimate the sensitivity of its returns to each specific factor. Factors that explain security returns can be classified as macroeconomic, fundamental, and statistical factors.

Multifactor models most commonly use macroeconomic factors such as GDP growth, inflation, or consumer confidence, along with fundamental factors such as earnings, earnings growth, firm size, and research expenditures. Statistical factors often have no basis in finance theory and are suspect in that they may represent only relations for a specific time period which have been identified by data mining (repeated tests on a single dataset).

The general form of a multifactor model with k factors is as follows:

$$E(R_i) - R_f = \beta_{i1} \times E(\text{Factor 1}) + \beta_{i2} \times E(\text{Factor 2}) + \dots + \beta_{ik} \times E(\text{Factor } k)$$

This model states that the expected excess return (above the risk-free rate) for Asset i is the sum of each **factor sensitivity** or **factor loading** (the β s) for Asset i multiplied by the expected value of that factor for the period. The first factor is often the expected excess return on the market, $E(R_m - R_f)$.

One multifactor model that is often used is that of Fama and French. They estimated the sensitivity of security returns to three factors: firm size, firm book value to market value ratio, and the return on the market portfolio minus the risk-free rate (excess return on the market portfolio). Carhart suggests a fourth factor that

measures price momentum using prior period returns. Together, these four factors do a relatively good job of explaining returns differences for U.S. equity securities over the period for which the model has been estimated.

The simplest factor model is a single-factor model. A single-factor model with the return on the market, R_m , as its only risk factor can be written (in excess returns form) as:

$$E(R_i) - R_f = \beta_i \times [E(R_m) - R_f]$$

Here, the expected excess return (return above the risk-free rate) is the product of the factor weight or factor sensitivity, Beta i , and the risk factor, which in this model is the excess return on the market portfolio or market index, so that this is also sometimes called a **single-index model**.

A simplified form of a single-index model is the **market model**, which is used to estimate a security's (or portfolio's) beta and to estimate a security's abnormal return (return above its expected return) based on the actual market return.

The form of the market model is as follows:

$$R_i = \alpha_i + \beta_i R_m + e_i$$

where:

R_i = return on Asset i

R_m = market return

β_i = slope coefficient

α_i = intercept

e_i = abnormal return on Asset i

The intercept α_i and slope coefficient β_i are estimated from historical return data. We can require that α_i is the risk-free rate times $(1 - \beta_i)$ to be consistent with the general form of a single-index model in excess returns form.

The expected return on Asset i is $\alpha_i + \beta_i E(R_m)$. A deviation from the expected return in a given period is the abnormal return on Asset i , e_i , or $R_i - (\alpha_i + \beta_i R_m)$.

In the market model, the factor sensitivity or beta for Asset i is a measure of how sensitive the return on Asset i is to the return on the overall market portfolio (market index).

LOS 21.e: Calculate and interpret beta.

The sensitivity of an asset's return to the return on the market index in the context of the market model is referred to as its **beta**. Beta is a standardized measure of the covariance of the asset's return with the market return. Beta can be calculated as follows:

$$\beta_i = \frac{\text{covariance of Asset } i\text{'s return with the market return}}{\text{variance of the market return}} = \frac{\text{Cov}_{im}}{\sigma_m^2}$$

We can use the definition of the correlation between the returns on Asset i with the returns on the market index:

$$\rho_{im} = \frac{\text{Cov}_{im}}{\sigma_i \sigma_m}$$

$$\text{to get } \text{Cov}_{im} = \rho_{im} \sigma_i \sigma_m$$

Substituting for Cov_{im} in the equation for B_i , we can also calculate beta as:

$$\beta_i = \frac{\rho_{im} \sigma_i \sigma_m}{\sigma_m^2} = \rho_{im} \left(\frac{\sigma_i}{\sigma_m} \right)$$

EXAMPLE: Calculating an asset's beta

The standard deviation of the return on the market index is estimated as 20%.

1. If Asset A's standard deviation is 30% and its correlation of returns with the market index is 0.8, what is Asset A's beta?

Using the formula $\beta_i = \rho_{im} \left(\frac{\sigma_i}{\sigma_m} \right)$, we have: $\beta_i = 0.80 \left(\frac{0.30}{0.20} \right) = 1.2$.

2. If the covariance of Asset A's returns with the returns on the market index is 0.048, what is the beta of Asset A?

Using the formula $\beta_i = \frac{\text{Cov}_{im}}{\sigma_m^2}$, we have $\beta_i = \frac{0.048}{0.2^2} = 1.2$.

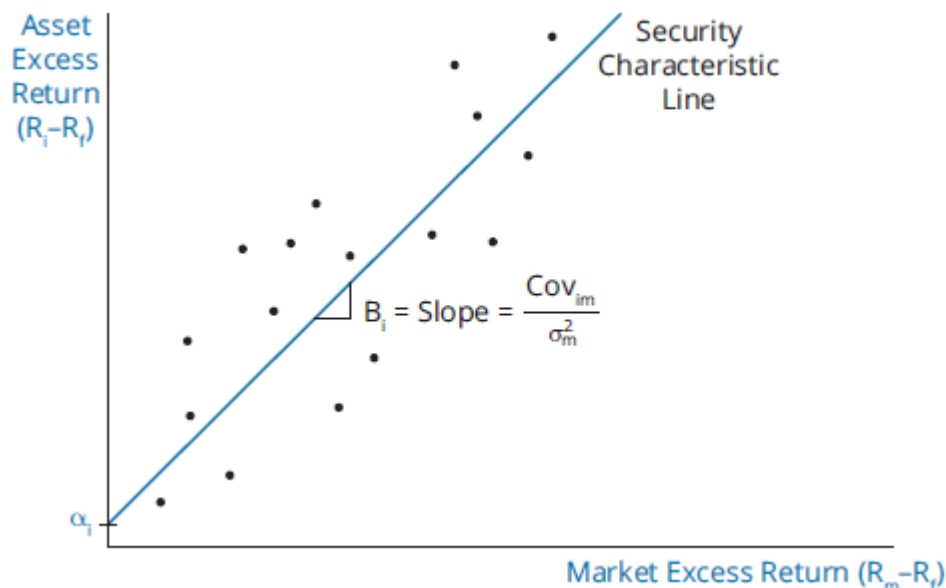


PROFESSOR'S NOTE

You should be able to calculate beta using either of the approaches illustrated in this example.

In practice, we estimate asset betas by regressing returns on the asset on those of the market index. In Figure 21.5, we represent the excess returns on Asset i as the dependent variable and the excess returns on the market index as the independent variable. The least squares regression line is the line that minimizes the sum of the squared distances of the points plotted from the line (this is what is meant by the line of best fit). The slope of this line is our estimate of beta. In Figure 21.6, the line is steeper than 45 degrees, the slope is greater than one, and the asset's estimated beta is greater than one. Our interpretation is that the returns on Asset i are more variable in response to systematic risk factors than is the overall market, which has a beta of one.

Figure 21.6: Regression of Asset Excess Returns Against Market Asset Returns



This regression line is referred to as the asset's **security characteristic line**.

Mathematically, the slope of the security characteristic line is $\frac{\text{Cov}_{im}}{\sigma_m^2}$, which is the same formula we used earlier to calculate beta.



MODULE QUIZ 21.1

1. An investor put 60% of his portfolio into a risky asset offering a 10% return with a standard deviation of returns of 8% and put the balance of his portfolio in a risk-free asset offering 5%. What is the expected return and standard deviation of his portfolio?

	<u>Expected return</u>	<u>Standard deviation</u>
A.	6.0%	6.8%
B.	8.0%	4.8%
C.	10.0%	6.6%

2. What is the risk measure associated with the capital market line (CML)?
 - A. Beta risk.
 - B. Unsystematic risk.
 - C. Total risk.
3. A portfolio to the right of the market portfolio on the CML is a(n):
 - A. lending portfolio.
 - B. borrowing portfolio.
 - C. inefficient portfolio.
4. As the number of stocks in a portfolio increases, the portfolio's systematic risk:
 - A. can increase or decrease.
 - B. decreases at a decreasing rate.
 - C. decreases at an increasing rate.
5. Total risk equals:
 - A. unique plus diversifiable risk.
 - B. market plus nondiversifiable risk.
 - C. systematic plus unsystematic risk.
6. A return generating model is *least likely* to be based on a security's exposure to:
 - A. statistical factors.
 - B. macroeconomic factors.
 - C. fundamental factors.

7. The covariance of the market's returns with a stock's returns is 0.005 and the standard deviation of the market's returns is 0.05. What is the stock's beta?
- A. 1.0.
B. 1.5.
C. 2.0.

MODULE 21.2: THE CAPM AND THE SML



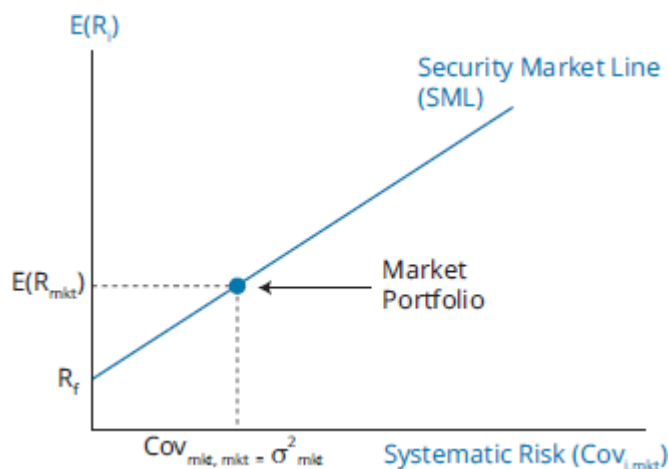
Video covering this content is available online.

LOS 21.f: Explain the capital asset pricing model (CAPM), including its assumptions, and the security market line (SML).

LOS 21.g: Calculate and interpret the expected return of an asset using the CAPM.

Given that the only relevant (priced) risk for an individual Asset i is measured by the covariance between the asset's returns and the returns on the market, $\text{Cov}_{i,\text{mkt}}$, we can plot the relationship between risk and return for individual assets using $\text{Cov}_{i,\text{mkt}}$ as our measure of systematic risk. The resulting line, plotted in Figure 21.7, is one version of what is referred to as the **security market line (SML)**.

Figure 21.7: Security Market Line



The equation of the SML is:

$$E(R_i) = R_f + \frac{E(R_{\text{mkt}}) - R_f}{\sigma_{\text{mkt}}^2} (\text{Cov}_{i,\text{mkt}})$$

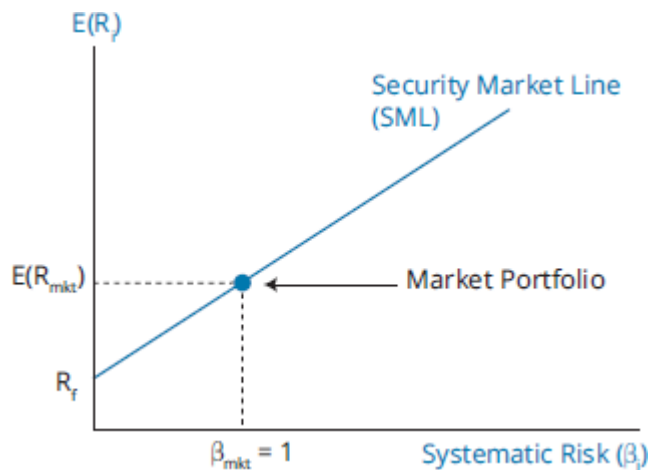
which can be rearranged and stated as:

$$E(R_i) = R_f + \frac{\text{Cov}_{i,\text{mkt}}}{\sigma_{\text{mkt}}^2} [E(R_{\text{mkt}}) - R_f]$$

The line described by this last equation is presented in Figure 21.8, where we let the standardized covariance term, $\frac{\text{Cov}_{i,\text{mkt}}}{\sigma_{\text{mkt}}^2}$, be defined as beta, β_i .

This is the most common means of describing the SML, and this relation between beta (systematic risk) and expected return is known as the **capital asset pricing model (CAPM)**.

Figure 21.8: The Capital Asset Pricing Model



So, we can define beta, $\beta = \frac{\text{Cov}_{i, \text{mkt}}}{\sigma_{\text{mkt}}^2}$, as a standardized measure of systematic risk.

Beta measures the relation between a security's excess returns and the excess returns to the market portfolio.

Formally, the CAPM is stated as:

$$E(R_i) = R_f + \beta_i[E(R_{\text{mkt}}) - R_f]$$

The CAPM holds that, in equilibrium, the expected return on risky asset $E(R_i)$ is the risk-free rate (R_f) plus a beta-adjusted market risk premium, $\beta_i[E(R_{\text{mkt}}) - R_f]$. Beta measures systematic (market or covariance) risk.

EXAMPLE: Capital asset pricing model

The expected return on the market is 8%, the risk-free rate is 2%, and the beta for Stock A is 1.2. Calculate the rate of return that would be expected (required) on this stock.

Answer:

$$E(R_A) = 2\% + 1.2(8\% - 2\%) = 9.2\%$$

Note: $\beta_A > 1$, so $E(R_A) > E(R_{\text{mkt}})$

The **assumptions of the CAPM** are:

- *Risk aversion.* To accept a greater degree of risk, investors require a higher expected return.
- *Utility maximizing investors.* Investors choose the portfolio, based on their individual preferences, with the risk and return combination that maximizes their (expected) utility.
- *Frictionless markets.* There are no taxes, transaction costs, or other impediments to trading.
- *One-period horizon.* All investors have the same one-period time horizon.
- *Homogeneous expectations.* All investors have the same expectations for assets' expected returns, standard deviation of returns, and returns correlations between assets.

- *Divisible assets.* All investments are infinitely divisible.
- *Competitive markets.* Investors take the market price as given and no investor can influence prices with their trades.

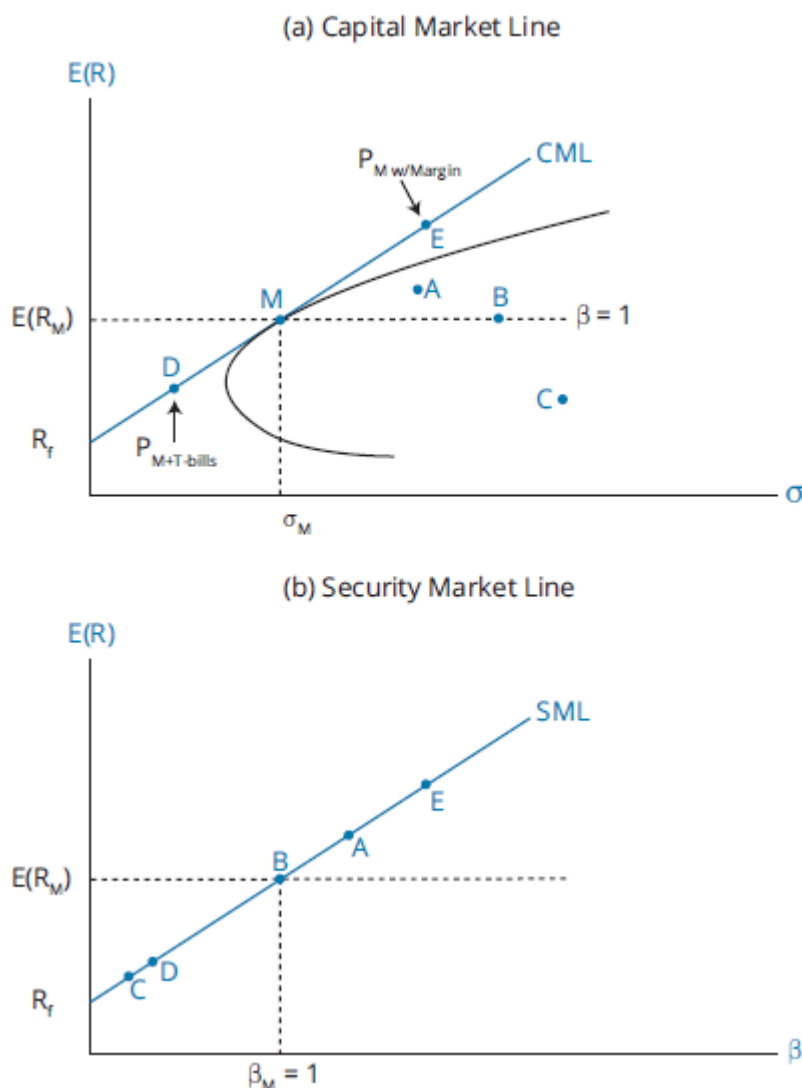
Comparing the CML and the SML

It is important to recognize that the CML and SML are very different. Recall the equation of the CML:

$$E(R_P) = R_f + \sigma_P \left\{ \frac{[E(R_M) - R_f]}{\sigma_M} \right\}$$

The CML uses total risk = σ_P on the x-axis. Hence, only efficient portfolios will plot on the CML. On the other hand, the SML uses beta (systematic risk) on the x-axis. So in a CAPM world, *all properly priced securities and portfolios of securities will plot on the SML*, as shown in Figure 21.9.

Figure 21.9: Comparing the CML and the SML



Portfolios that are not well diversified (efficient) plot inside the efficient frontier and are represented by risk-return combinations such as Points A, B, and C in Panel A of Figure 21.9. Individual securities are one example of such inefficient portfolios. According to the CAPM, the expected returns on all portfolios, well diversified or

not, are determined by their systematic risk. Thus, according to the CAPM, Point A represents a high-beta stock or portfolio, Point B a stock or portfolio with a beta of one, and Point C a low-beta stock or portfolio. We know this because the expected return at Point B is equal to the expected return on the market, and the expected returns at Point A and C are greater and less than the expected return on the market (tangency) portfolio, respectively.

Note that a low-beta stock, such as represented by Point C, is not necessarily low-risk when total risk is considered. While its contribution to the risk of a well-diversified portfolio may be low, its risk when held by itself can be considered quite high. A firm whose only activity is developing a new, but as yet unproven, drug may be quite speculative with highly uncertain returns. It may also have quite low systematic risk if the uncertainty about its future returns depends primarily on firm-specific factors.

All stocks and portfolios that plot along the line labeled $\beta = 1$ in Figure 21.9 have the same expected return as the market portfolio and, thus, according to the CAPM, have the same systematic risk as the market portfolio (i.e., they all have betas of one).

All points on the CML (except the tangency point) represent the risk-return characteristics of portfolios formed by either combining the market portfolio with the risk-free asset or borrowing at the risk-free rate in order to invest more than 100% of the portfolio's net value in the risky market portfolio (investing on margin). Point D in Figure 21.9 represents a portfolio that combines the market portfolio with the risk-free asset, while points above the point of tangency, such as Point E, represent portfolios created by borrowing at the risk-free rate to invest in the market portfolio. Portfolios that do not lie on the CML are not efficient and therefore have risk that will not be rewarded with higher expected returns in equilibrium.

According to the CAPM, all securities and portfolios, diversified or not, will plot on the SML in equilibrium. In fact, all stocks and portfolios along the line labeled $\beta = 1$ in Figure 21.9, including the market portfolio, will plot at the same point on the SML. They will plot at the point on the SML with beta equal to one and expected return equal to the expected return on the market, regardless of their total risk.

LOS 21.h: Describe and demonstrate applications of the CAPM and the SML.

We have used beta to estimate a security's expected return based on our estimate of the risk-free rate and the expected return on the market. In equilibrium, a security's expected return and its required return (by investors) are equal. Therefore, we can use the CAPM to estimate a security's required return.

Because the SML shows the equilibrium (required) return for any security or portfolio based on its beta (systematic risk), analysts often compare their forecast of a security's return to its required return based on its beta risk. The following example illustrates this technique.

EXAMPLE: Identifying mispriced securities

The following figure contains information based on analyst's forecasts for three stocks. Assume a risk-free rate of 7% and a market return of 15%. Calculate the expected and required return on each stock, determine whether each stock is undervalued, overvalued, or properly valued, and outline an appropriate trading strategy.

Forecast Data

Stock	Price Today	E(Price) in 1 Year	E(Dividend) in 1 Year	Beta
A	\$25	\$27	\$1.00	1.0
B	40	45	2.00	0.8
C	15	17	0.50	1.2

Answer:

Expected and required returns computations are shown in the following figure.

Forecasts vs. Required Returns

Stock	Forecast Return	Required Return
A	$(\$27 - \$25 + \$1) / \$25 = 12.0\%$	$0.07 + (1.0)(0.15 - 0.07) = 15.0\%$
B	$(\$45 - \$40 + \$2) / \$40 = 17.5\%$	$0.07 + (0.8)(0.15 - 0.07) = 13.4\%$
C	$(\$17 - \$15 + \$0.5) / \$15 = 16.6\%$	$0.07 + (1.2)(0.15 - 0.07) = 16.6\%$

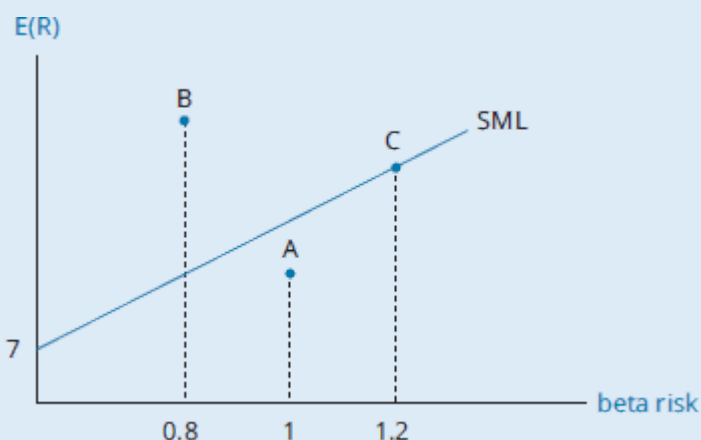
- Stock A is *overvalued*. It is expected to earn 12%, but based on its systematic risk, it should earn 15%. It plots *below* the SML.
- Stock B is *undervalued*. It is expected to earn 17.5%, but based on its systematic risk, it should earn 13.4%. It plots *above* the SML.
- Stock C is *properly valued*. It is expected to earn 16.6%, and based on its systematic risk, it should earn 16.6%. It plots *on* the SML.

The appropriate trading strategy is:

- Short sell Stock A.
- Buy Stock B.
- Buy, sell, or ignore Stock C.

We can do this same analysis graphically. The expected return/beta combinations of all three stocks are graphed in the following figure relative to the SML.

Identifying Mispriced Securities



PROFESSOR'S NOTE



If the estimated return plots “over” the SML, the security is “under” valued. If the estimated return plots “under” the SML, the security is “over” valued.

Remember, all stocks should plot on the SML; any stock not plotting on the SML is mispriced. Notice that Stock A falls below the SML, Stock B lies above the SML, and Stock C is on the SML. If you plot a stock's expected return and it falls below the SML, the stock is overpriced. That is, the stock's expected return is too low given its systematic risk. If a stock plots above the SML, it is underpriced and is offering an expected return greater than required for its systematic risk. If it plots on the SML, the stock is properly priced.

Because the equation of the SML is the capital asset pricing model, you can determine if a stock is over- or underpriced graphically or mathematically. Your answers will always be the same.

LOS 21.i: Calculate and interpret the Sharpe ratio, Treynor ratio, M^2 , and Jensen's alpha.

Performance evaluation of an active manager's portfolio choices refers to the analysis of the risk and return of the portfolio. **Attribution analysis**, an analysis of the sources of returns differences between active portfolio returns and those of a passive benchmark portfolio, is part of performance evaluation. Success in active portfolio management cannot be determined simply by comparing portfolio returns to benchmark portfolio returns; the risk taken to achieve returns must also be considered. A portfolio with greater risk than the benchmark portfolio (especially beta risk) is expected to produce higher returns over time than the benchmark portfolio.

When evaluating the performance of a portfolio with risk that differs from that of a benchmark portfolio, we need to adjust the active portfolio return's risk. Of the alternative ways to consider both risk and return in evaluating portfolio performance, the most commonly used is the **Sharpe ratio**. The Sharpe ratio of a portfolio is its excess returns per unit of total portfolio risk. Higher Sharpe ratios indicate better risk-adjusted portfolio performance.

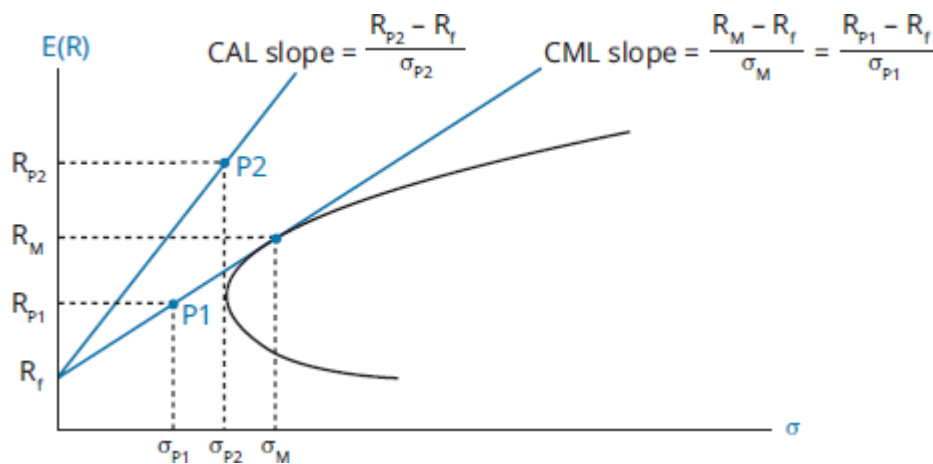
$$\text{Sharpe ratio} = \frac{E[R_{\text{portfolio}}] - R_f}{\sigma_{\text{portfolio}}}$$

We have shown the Sharpe ratio as an ex ante (before the fact) measure, using the expected values of portfolio returns and standard deviation. However, it can also be used as an ex post (after the fact) measure of portfolio performance, using mean returns and sample standard deviation over a period.

The Sharpe ratio is based on total risk (standard deviation of returns), rather than systematic risk (beta). For this reason, the Sharpe ratio can be used to evaluate the performance of concentrated portfolios (those affected by unsystematic risk) as well as well-diversified portfolios (those with only systematic, or beta, risk). Note that the value of the Sharpe ratio is only useful for comparison with the Sharpe ratio of another portfolio.

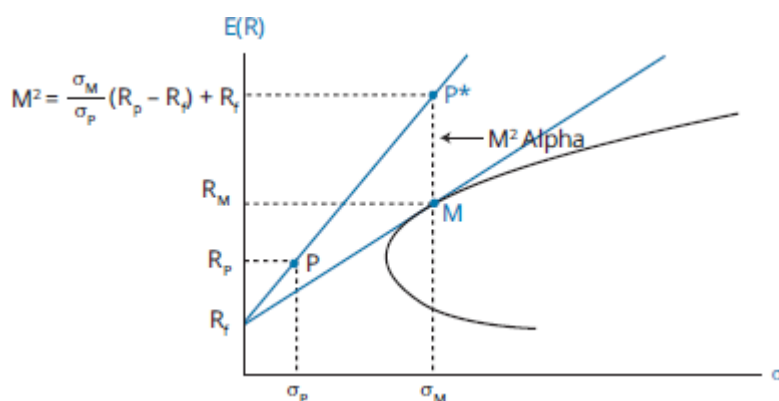
In Figure 21.10, we illustrate that the Sharpe ratio of a portfolio is the slope of the CAL for that portfolio and can be compared to the slope of the CML, which is the Sharpe ratio for portfolios that lie on the CML.

Figure 21.10: Sharpe Ratios as Slopes



For a portfolio of risky assets, **M-squared (M^2)** is an alternative to the Sharpe ratio as a risk-adjusted rate of return, expressed as a percentage rather than as a slope. Given a Portfolio P, we can calculate the return on a Portfolio P* that is leveraged (when $\sigma_M > \sigma_P$), or deleveraged (when $\sigma_M < \sigma_P$), so that P* has the same risk (standard deviation of returns) as the market portfolio. The return on P* is $R_f + \frac{\sigma_M}{\sigma_P}(R_P - R_f)$ and we refer to that as the M^2 measure for Portfolio P. We illustrate the return on the leveraged Portfolio P*, given the standard deviation and return on Portfolio P, in Figure 21.11. The extra return on the Portfolio P* above the return on the market portfolio, ($P^* - R_M$), is referred to as **M2 alpha**. Note that in Figure 21.11, P* is created by borrowing at R_f and investing the proceeds in Portfolio P, in an amount so that the standard deviation of $P^* = \sigma_M$.

Figure 21.11: M-Squared for a Portfolio



The M^2 measure produces the same risk-adjusted portfolio rankings as the Sharpe ratio, but is stated in percentage terms. Note that M^2 can be derived from the Sharpe ratio (SR) for Portfolio P, $SR = (R_P - R_f) / \sigma_P$, as $SR(\sigma_M) + R_f$, so that if the Sharpe ratio of Portfolio P is greater than the slope of the CML, $M^2 > R_M$ and $M^2 \text{ alpha} > 0$.

As an example, consider a Portfolio P with return of 10% and standard deviation of returns of 20%, when $R_f = 5\%$, $R_M = 11\%$ and $\sigma_M = 30\%$. The Sharpe ratio of

Portfolio P = $(10 - 5)/20 = 0.25$, and $M^2 = 0.25(0.30) + 0.05 = 12.5\%$. Comparing that to $R_M = 11\%$, we can see that M^2 alpha is 1.5%.

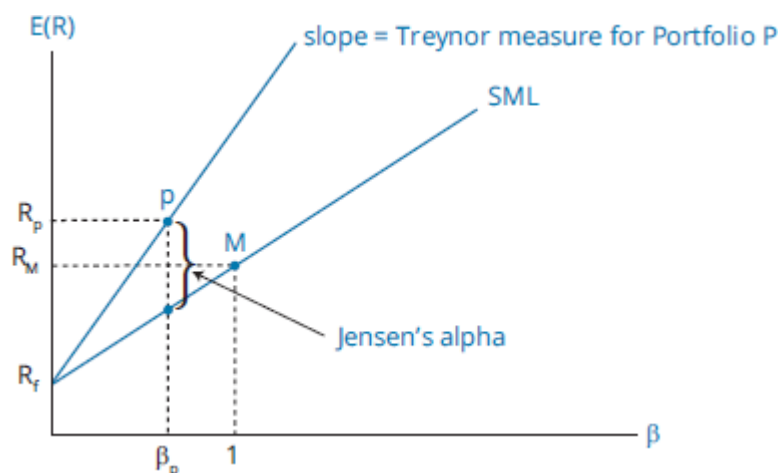
Two measures of portfolio performance based on systematic (beta) risk rather than total risk are the **Treynor measure** and **Jensen's alpha**. They are analogous to the Sharpe ratio and M^2 in that the Treynor measure is a measure of slope and Jensen's alpha is a measure of percentage returns in excess of those from a portfolio that has the same risk (beta) but lies on the SML.

The Treynor measure is calculated as $\frac{R_P - R_f}{\beta_P}$, interpreted as excess returns per unit of systematic risk, and represented by the slope of a line as illustrated in Figure 21.12. Jensen's alpha for Portfolio P is calculated as

$$\alpha_P = R_P - [R_f + \beta_P(R_M - R_f)]$$

and is the percentage portfolio return above that of a portfolio (or security) with the same beta as the portfolio that lies on the SML, as illustrated in Figure 21.12.

Figure 21.12: Treynor Measure and Jensen's Alpha



Whether risk adjustment should be based on standard deviation of returns or portfolio beta depends on whether a manager's portfolio bears unsystematic risk. If a single manager is used, then the total risk (including any nonsystematic risk) is the relevant measure and risk adjustment using total risk, as with the Sharpe and M^2 measures, is appropriate. If a fund uses multiple managers so that the overall fund portfolio is well diversified (has no unsystematic risk), then performance measures based on systematic (beta) risk, such as the Treynor measure and Jensen's alpha, are appropriate.

These measures of risk-adjusted returns are often used to compare the performance of actively managed funds to passively managed funds. Note in Figure 21.10 and Figure 21.11 that portfolios that lie above the CML have Sharpe ratios greater than those of any portfolios along the CML and have positive M^2 measures. Similarly, in Figure 21.12, we can see that portfolios that lie above the SML have Treynor measures greater than those of any security or portfolio that lies along the SML and also have positive values for Jensen's alpha.

One final note of caution is that estimating the values needed to apply these theoretical models and performance measures is often difficult and is done with

error. The expected return on the market, and thus the market risk premium, may not be equal to its average historical value. Estimating security and portfolio betas is done with error as well.



PROFESSOR'S NOTE

The Portfolio Management topic pauses at this point but continues later in the sequence of Level I readings.



MODULE QUIZ 21.2

1. Which of the following statements about the SML and the CML is *least accurate*?
 - A. Securities that plot above the SML are undervalued.
 - B. Investors expect to be compensated for systematic risk.
 - C. Securities that plot on the SML have no value to investors.
2. According to the CAPM, what is the expected rate of return for a stock with a beta of 1.2, when the risk-free rate is 6% and the market rate of return is 12%?
 - A. 7.2%.
 - B. 12.0%.
 - C. 13.2%.
3. According to the CAPM, what is the required rate of return for a stock with a beta of 0.7, when the risk-free rate is 7% and the expected market rate of return is 14%?
 - A. 11.9%.
 - B. 14.0%.
 - C. 16.8%.
4. The risk-free rate is 6%, and the expected market return is 15%. A stock with a beta of 1.2 is selling for \$25 and will pay a \$1 dividend at the end of the year. If the stock is priced at \$30 at year-end, it is:
 - A. overpriced, so short it.
 - B. underpriced, so buy it.
 - C. underpriced, so short it.
5. A stock with a beta of 0.7 currently priced at \$50 is expected to increase in price to \$55 by year-end and pay a \$1 dividend. The expected market return is 15%, and the risk-free rate is 8%. The stock is:
 - A. overpriced, so do not buy it.
 - B. underpriced, so buy it.
 - C. properly priced, so buy it.
6. Which of these return metrics is defined as excess return per unit of systematic risk?
 - A. Sharpe ratio.
 - B. Jensen's alpha.
 - C. Treynor measure.

KEY CONCEPTS

LOS 21.a

The availability of a risk-free asset allows investors to build portfolios with superior risk-return properties. By combining a risk-free asset with a portfolio of risky assets, the overall risk and return can be adjusted to appeal to investors with various degrees of risk aversion.

LOS 21.b

On a graph of return versus risk, the various combinations of a risky asset and the risk-free asset form the capital allocation line (CAL). In the specific case where the risky asset is the market portfolio, the combinations of the risky asset and the risk-free asset form the capital market line (CML).

LOS 21.c

Systematic (market) risk is due to factors, such as GDP growth and interest rate changes, that affect the values of all risky securities. Systematic risk cannot be reduced by diversification. Unsystematic (firm-specific) risk can be reduced by portfolio diversification.

Because one of the assumptions underlying the CAPM is that portfolio diversification to eliminate unsystematic risk is costless, investors cannot increase expected equilibrium portfolio returns by taking on unsystematic risk.

LOS 21.d

A return generating model is an equation that estimates the expected return of an investment, based on a security's exposure to one or more macroeconomic, fundamental, or statistical factors.

The simplest return generating model is the market model, which assumes the return on an asset is related to the return on the market portfolio in the following manner:

$$R_i = \alpha_i + \beta_i R_m + e_i$$

LOS 21.e

Beta can be calculated using the following equation:

$$\beta_i = \frac{[\text{Cov}(R_i, R_m)]}{\sigma_m^2} = \rho_{im} \left(\frac{\sigma_i}{\sigma_m} \right)$$

where $[\text{Cov}(R_i, R_m)]$ and $\rho_{i,m}$ are the covariance and correlation between the asset and the market, and σ_i and σ_m are the standard deviations of asset returns and market returns.

The theoretical average beta of stocks in the market is 1. A beta of zero indicates that a security's return is uncorrelated with the returns of the market.

LOS 21.f

The capital asset pricing model (CAPM) requires several assumptions:

- Investors are risk averse, utility maximizing, and rational.
- Markets are free of frictions like costs and taxes.
- All investors plan using the same time period.
- All investors have the same expectations of security returns.
- Investments are infinitely divisible.
- Prices are unaffected by an investor's trades.

The security market line (SML) is a graphical representation of the CAPM that plots expected return versus beta for any security.

LOS 21.g

The CAPM relates expected return to the market factor (beta) using the following formula:

$$E(R_i) - R_f = \beta_i[E(R_m) - R_f]$$

LOS 21.h

The CAPM and the SML indicate what a security's equilibrium required rate of return should be based on the security's exposure to market risk. An analyst can compare his expected rate of return on a security to the required rate of return indicated by the SML to determine whether the security is overvalued, undervalued, or properly valued.

LOS 21.i

The Sharpe ratio measures excess return per unit of total risk and is useful for comparing portfolios on a risk-adjusted basis.

$$\text{Sharpe ratio} = \left(\frac{R_P - R_f}{\sigma_P} \right)$$

Given a Portfolio P, we can calculate the return on a Portfolio P* that is leveraged or deleveraged, so that P* has the same risk as the market portfolio. The return on P* is the M-squared measure for Portfolio P.

$$M^2 = R_f + \frac{\sigma_M}{\sigma_P}(R_P - R_f)$$

M-squared alpha is the extra return on Portfolio P* above the market portfolio.

The Treynor measure measures a portfolio's excess return per unit of systematic risk. Jensen's alpha is the difference between a portfolio's return and the return of a portfolio on the SML that has the same beta:

$$\text{Treynor measure} = \frac{R_P - R_f}{\beta_P}$$

$$\text{Jensen's alpha} = \alpha_P = R_P - [R_f + \beta_P(R_M - R_f)]$$

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 21.1

- B** Expected return: $(0.60 \times 0.10) + (0.40 \times 0.05) = 0.08$, or 8.0%
Standard deviation: $0.60 \times 0.08 = 0.048$, or 4.8%
(LOS 21.a)
- C** The capital market line (CML) plots return against *total risk*, which is measured by standard deviation of returns. (LOS 21.b)
- B** A portfolio to the right of a portfolio on the CML has more risk than the market portfolio. Investors seeking to take on more risk will *borrow* at the risk-free rate to purchase more of the market portfolio. (LOS 21.b)
- A** When you increase the number of stocks in a portfolio, *unsystematic risk* will decrease at a decreasing rate. However, the portfolio's *systematic risk* can be

increased by adding higher-beta stocks or decreased by adding lower-beta stocks. (LOS 21.c)

5. **C** Total risk equals systematic plus unsystematic risk. Unique risk is diversifiable and is unsystematic. Market (systematic) risk is nondiversifiable risk. (LOS 21.c)
6. **A** Macroeconomic, fundamental, and statistical factor exposures can be included in a return generating model to estimate the expected return of an investment. However, statistical factors may not have any theoretical basis, so analysts prefer macroeconomic and fundamental factor models. (LOS 21.d)
7. **C** $\text{beta} = \text{covariance} / \text{market variance}$
 $\text{market variance} = 0.05^2 = 0.0025$
 $\text{beta} = 0.005 / 0.0025 = 2.0$
(LOS 21.e)

Module Quiz 21.2

1. **C** Securities that plot on the SML are expected to earn their equilibrium rate of return and, therefore, do have value to an investor and may have diversification benefits as well. The other statements are true. (LOS 21.f)
2. **C** $6 + 1.2(12 - 6) = 13.2\%$ (LOS 21.g)
3. **A** $7 + 0.7(14 - 7) = 11.9\%$ (LOS 21.g)
4. **B** $\text{required rate} = 6 + 1.2(15 - 6) = 16.8\%$
 $\text{return on stock} = (30 - 25 + 1) / 25 = 24\%$
Based on risk, the stock plots above the SML and is underpriced, so buy it. (LOS 21.h)
5. **A** $\text{required rate} = 8 + 0.7(15 - 8) = 12.9\%$
 $\text{return on stock} = (55 - 50 + 1) / 50 = 12\%$
The stock falls below the SML, so it is *overpriced*. (LOS 21.h)
6. **C** The Treynor measure is excess return (return in excess of the risk-free rate) per unit of systematic risk (beta). The Sharpe ratio is excess return per unit of total risk (portfolio standard deviation). Jensen's alpha is the difference between a portfolio's actual rate of return and the equilibrium rate of return for a portfolio with the same level of beta (systematic) risk. (LOS 21.i)

READING 22

ORGANIZATIONAL FORMS, CORPORATE ISSUER FEATURES, AND OWNERSHIP

MODULE 22.1: FEATURES OF CORPORATE ISSUERS



Video covering
this content is
available online.

LOS 22.a: Compare the organizational forms of businesses.

Organizational forms refer to how businesses are set up from a legal and organizational point of view. Key features of organizational forms include the following:

- Whether the business is a separate legal entity from the owner(s)
- Whether the owners of the business also operate the business, and if not, the nature of the relationship between its owners and operators
- Whether the owners' liability for the actions and debts of the business is limited or unlimited
- The tax treatment of profits or losses from the business
- Access to additional capital to fund expansion and to distribute risk

To understand these features, we can compare them among four commonly used types of business structures: sole proprietorships, general partnerships, limited partnerships, and corporations.

A **sole proprietorship** is a business owned and operated by an individual. Legally, the business is an extension of the owner, who is personally responsible for claims against the business (i.e., unlimited liability) and receives all profits/losses.

Profits are then taxed as personal income of the owner. Sole proprietorships tend to be small in scale because they can only expand within the limits of the individual owner's ability to secure financing.

To do business on a scale that exceeds that of a sole proprietorship, two or more individuals can form a **general partnership**. In this structure, the **partnership agreement** specifies each partner's responsibilities for business operations and their shares of the partnership profits or losses. The agreement may be written, verbal, or even incidental through the actions of the partners. As with a sole

proprietorship, the partners have unlimited liability for claims against the business, and profits from the business allocated to each partner are taxed as personal income.

A **limited partnership** involves two levels of partners. One or more general partners operate the business and have unlimited liability, as in a general partnership, but this structure also has **limited partners** who are liable only for the amount they invest in the partnership (i.e., **limited liability**) and have claims to its profits that are proportionate to their investments. Limited partners typically are not involved in appointing or removing general partners. How the profits are divided among the general and limited partners is specified in the partnership agreement. Because they are responsible for managing the business, the general partners typically receive a larger portion of profits than the limited partners. Profits allocated to the partners are taxed as personal income to each partner. Some jurisdictions allow a **limited liability partnership (LLP)** wherein a general partner is not required, and all the partners are limited partners. In the United States, LLPs are only allowed for providers of professional services such as law, accounting, and so on, and there are restrictions on the number of partners and the amount of equity investment.

The feature that distinguishes a **corporation**, or **limited company**, from the other business structures is that a corporation is a legal entity separate from its owners and managers. In this case, *all* of the corporation's shareholders have limited liability. An owner can lose his entire investment if the company goes bankrupt and the value of his shares goes to zero. Beyond their initial investments, shareholders are not responsible for claims against the corporation. A corporation may, but is not required to, distribute its profits to its owners. Most large firms are corporations because that structure gives them the greatest access to capital, both debt (**borrowed capital**) and equity (**ownership capital**).

Another distinguishing feature of corporations is the separation of its owners and managers. An investor who buys shares of a corporation does not directly influence the company's day-to-day operations. Instead, the owners appoint a **board of directors** that is responsible for hiring the senior managers to operate the company. The board and the managers it hires are responsible for acting in the interests of the shareholders.

A **public corporation** (or a **public limited company**) is one that has shares that are sold to the public and trade in an organized market (stock exchange). A **private limited company** is similar to a public company, but it has a limited number of shareholders and restrictions on transfer of shares.

Depending on the country, a corporation's profits may be subject to **double taxation** if the government taxes companies on their earnings *and* it taxes dividends (which are distributions of earnings to owners) as personal income.

LOS 22.b: Describe key features of corporate issuers.

A corporation's legal identity is separate from that of its owners and is formed by filing an **articles of incorporation** with a regulatory body. As a legal entity, a

corporation has many of the rights and responsibilities of an individual, such as the right to hire employees, enter into contracts, borrow and lend money, and so on.

A corporation issues shares to the owners (shareholders), which allows it to raise large amounts of capital. Shareholders have **voting rights** that allow them to elect the board of directors. Shares are easily transferable if they are traded on an exchange. The board of directors may distribute a portion of the company's earnings to the shareholders as **dividends**.

The disadvantage of double taxation of corporate income is less for investors in companies that pay out a smaller fraction of their profits in dividends and reinvest the remaining, as illustrated in the following example.

EXAMPLE: Double taxation of dividends

ABC Corporation has pretax earnings of \$10 million and a corporate tax rate of 25%. Shareholders are taxed at 20% on their dividend income. Calculate the effective tax rate if:

- (a) 100% of the profits are paid out in dividends, and
- (b) 40% of the profits are paid out in dividends.

Answer:

	(a) 100% payout	(b) 40% payout
Earnings before tax	\$ 10,000,000	\$ 10,000,000
(-) Corporate income tax @ 25%	<u>2,500,000</u>	<u>2,500,000</u>
(=) After-tax income	7,500,000	7,500,000
Dividends	7,500,000	3,000,000
Tax on dividends @ 20%	1,500,000	600,000
Total tax paid	4,000,000	3,100,000
Effective tax rate		
= Total tax / earnings before tax	40%	31%

LOS 22.c: Compare publicly and privately owned corporate issuers.

Most public limited companies are **listed companies**, which means their shares are listed on an exchange, allowing investors to trade shares. A stock exchange is a rules-based open market, providing price and volume transparency. Shareholders in a company can be individuals, other corporations, nonprofits, or government. Shares that are actively traded (i.e., not held by insiders, strategic investors, or sponsors) are called the company's **free float**. Free float is typically expressed as a percentage of total outstanding shares.

Public companies are subject to compliance and reporting requirements. For example, companies are required to file quarterly or annual financial reports with a regulatory body, and to disclose any material changes in the company's business or ownership.

Shares in private limited companies do not trade on an exchange. As a result, their value is not readily observable, and transfer between investors is difficult. Typically,

investors in a private limited company have to wait until the company goes public or is sold to exit their investment. Private companies have fewer regulatory requirements and typically disclose less information than public companies. Also, with fewer investors, private companies can take a longer-term view of the business.

Private companies can raise equity capital through **private placements** of securities. Private placements are typically restricted to **accredited investors** such as corporate and institutional investors or high net worth individuals.

Private companies can become public companies (“go public”) in one of three ways: initial public offering, direct listing, or acquisition by a special purpose entity.

- A company can become public by issuing shares in an **initial public offering (IPO)**. To conduct an IPO, the company must meet exchange-specific requirements. Companies typically engage the services of an investment bank to underwrite the issue. Once the shares are listed on an exchange, owners can sell shares, and new owners can buy shares, without dealing directly with the company.
- In a **direct listing**, a stock exchange agrees to list a private company's existing shares. This differs from an IPO in that a direct listing does not raise any new capital for the company, but it has advantages in that it can be done more quickly than an IPO and without involving an underwriter.
- A **special purpose acquisition company (SPAC)** is a corporate structure set up to acquire a private company in the future. The SPAC raises capital through an IPO and puts the funds into a trust that it must use to make an acquisition within a specified time. The acquired company does not have to be identified at the time of the IPO. For this reason, SPACs are also known as “blank check” companies.

Sometimes there can be a benefit to taking an underperforming public company private to restructure it and unlock its potential value. In such a case, an acquirer purchases all the outstanding shares of a public company, and the company is delisted from the exchange. The benefits of going private include a lower regulatory burden and the associated cost savings.



MODULE QUIZ 22.1

1. Which organizational form has the highest degree of separation between the owners and operators of a business?
 - A. Corporation.
 - B. Limited partnership.
 - C. General partnership.
2. A corporation is subject to a corporate income tax of 10%. Shareholders are taxed on dividends at a rate of 15%. Assume that the company pays out all its after-tax profits in dividends. The effective tax rate on the corporation's profit is:
 - A. 12.5%.
 - B. 23.5%.
 - C. 25.0%.
3. A private company can become a public company through a:
 - A. private placement.
 - B. leveraged buyout.
 - C. special purpose acquisition company.

KEY CONCEPTS

LOS 22.a

Feature	Sole Proprietorship	General Partnership	Limited Partnership	Corporation
Separate legal entity?	No	No	No	Yes
Managed by	Owner	Partners	GPs	Board and managers
Owner liability	Unlimited	Unlimited	GPs: unlimited LPs: limited	Limited
Access to capital	Limited	Limited	Limited	Virtually unlimited
Taxation of profits	Pass through to owner as personal income	Pass through to owner as personal income	Pass through to owner as personal income	Potential double taxation

LOS 22.b

Corporations incorporate as a separate legal entity by registering with a regulatory body. Owners are shareholders with a limited liability, but profits may be subject to double taxation. Shareholders vote for a board of directors who then hire managers and declare dividend payments to the shareholders.

LOS 22.c

Public limited companies list their shares on a stock exchange for trading. Free float, or actively traded shares, is typically quoted as a fraction of total shares outstanding. Exchange listing requires regulatory compliance and extensive disclosure requirements.

Private companies raise capital in private placements. A private company can become public by issuing shares in an initial public offering, carrying out a direct listing on a stock exchange, or being acquired by a public company, which may be a special purpose acquisition company.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 22.1

- A** In a corporation, owners are most often not directly involved in operating the business. Both general partnerships and limited partnerships have general partners who operate the business. (LOS 22.a)
- B** The effective tax rate on profits distributed as dividends = $0.10 + 0.15 (1 - 0.10)$ = 23.5%. Alternatively:
 - Starting with a hypothetical \$100 of pretax profit, the corporate tax @10% is \$10.
 - Dividends = after-tax profit = \$90. Tax on dividends @ 15% = $0.15 \times 90 =$ \$13.50.
 - Total tax = $10 + 13.50 =$ \$23.50, or 23.5% of the pretax profit of \$100.

(LOS 22.b)

3. **C** An IPO, direct listing, and special purpose acquisition company are methods for a private company to go public. Private placements allow a private company to raise capital but not take it public. Buyouts can result in a public company going private. (LOS 22.c)

READING 23

INVESTORS AND OTHER STAKEHOLDERS

MODULE 23.1: STAKEHOLDERS AND ESG FACTORS



Video covering
this content is
available online.

LOS 23.a: Compare the financial claims and motivations of lenders and shareholders.

A company's lenders (debtholders) have a legal, contractual claim to the interest and principal payments the company has promised to make. Owners (equity holders) have a residual claim to the company's net assets (i.e., what remains after all other claims have been paid). That is, lenders have a higher priority of claims than equity owners. Because debt is less risky than equity, it is a less costly form of capital.

Both debtholders and equity holders can potentially lose their entire investment if a company fails, but their losses cannot exceed the amounts they have invested. A key difference between debt and equity investments is their upside potential. Regardless of a company's success, the best result debtholders can achieve is to receive the interest and principal payments promised by the company. Equity, on the other hand, has a theoretically unlimited upside if a company succeeds and grows over time.

The value of a company is the sum of the value of its debt and the value of its equity. As the company's value increases (assuming its value is greater than the value of its debt), the value of equity increases with it, while the value of debt is constant (i.e., no upside for debt investors from company growth). If the value of a company is less than the value of its debt, the value of its equity is zero, and the value of its debt is below the promised amount and moves with the value of the company (i.e., debt has downside exposure).

EXAMPLE: Impact of leverage on return on equity (ROE)

A company with revenues of \$1,000 and operating expenses of \$800 needs to invest \$1,000 in assets. The assets can be 100% equity or a mix of 50/50 debt and equity. The interest rate on debt is 10% (assume no taxes). Calculate the ROE under both financing scenarios.

Answer:

	100% Equity	50% Debt, 50% Equity
Revenues	\$1,000	\$1,000
Cash operating expense	\$800	\$800
Interest expense	\$0	\$50
Net income	\$200	\$150
Equity	\$1,000	\$500
ROE	20%	30%

As can be seen in the previous example, increasing leverage (and therefore, risk) can increase the return on equity as long as the *expected* rate of return on assets exceeds the cost of debt. If things work out, and the actual return on assets is equal to or exceeds the cost of debt, the equity investors benefit from taking the risk. Debt investors, however, receive only their promised 10% interest (and the return of principal when the debt matures).

EXAMPLE: IMPACT OF A DECREASE IN REVENUES

Continuing the previous example, calculate the company's ROE if its revenues decrease by 15%, assuming no change in cash operating expenses.

Answer:

	100% Equity	50% Debt, 50% Equity
Revenues	\$850	\$850
Cash operating expense	\$800	\$800
Interest expense	\$0	\$50
Net income	\$50	\$0
Equity	\$1,000	\$500
ROE	5%	0%

Assuming no change in cash operating expenses, a 15% decrease in revenues would reduce the ROE to 5% (100% equity scenario) or to 0% (50/50 debt and equity scenario). If the decrease in revenues exceeded 15%, revenues would not have been enough to cover operating expenses, and debt investors would receive less than their promised 10% interest. Again, debt investors have no upside—only potential downside.

Because of the difference in their risk profiles, the interests of debtholders may conflict with the interests of equity holders. Debtholders are primarily concerned with a company's ability to repay its obligations and less concerned with its growth prospects. Equity holders may favor actions that increase a company's potential growth, but also increase its risk level, such as adding financial leverage by issuing new debt. Issuing additional debt as opposed to equity also prevents **dilution** of shareholders' proportional ownership. A company's existing debtholders may oppose such actions because increasing the company's risk (and the probability of defaulting on its debts) does not increase their expected return. Therefore, debt

investors usually limit borrowers' actions by including contractual provisions such as maximum leverage or a minimum interest coverage ratio (known as *covenants*, which we will examine in the Fixed Income topic area) in debt agreements.

LOS 23.b: Describe a company's stakeholder groups and compare their interests.

Under **shareholder theory**, the primary focus of corporate governance is the interests of the firm's shareholders, which is to maximize the market value of the firm's common equity. Under this theory, corporate governance is primarily concerned with the conflict of interest between the firm's managers and its owners (shareholders).

The focus of corporate governance under **stakeholder theory** is broader. It considers conflicts among several groups that have an interest in the activities and performance of the firm.

Stakeholders of a Corporation

Shareholders have a *residual interest* in the corporation, in that they have claim to the net assets of the corporation after all liabilities have been settled. Shareholders have voting rights to elect the board of directors and for other important corporate matters, which gives them control over the firm and its management. They have an interest in ongoing profitability and growth of the firm that will increase the value of their ownership shares.

Lenders can be public or private debtholders. Public debtholders or **bondholders** supply debt capital to the firm and are primarily owners of the firm's outstanding bonds, while **private debtholders** such as banks extend loans, credit facilities, and leases to the firm.

Private debtholders may have access to nonpublic information from company management, which decreases information asymmetry. For this reason, private debtholders are a critical source of financing for small-to-medium-sized businesses. In some cases, private debtholders hold equity in the firm, allowing them to take a more equity-like approach to evaluating the company and potentially making them more amenable to changes in terms of the loans (i.e., covenants). By contrast, bondholders rely only on public information and have little to no influence over an issuer's operations. The interests of both types of lenders are protected to varying degrees by covenants in their debt agreements with the firm.

The **board of directors** is responsible for protecting the interests of shareholders; hiring, firing, and setting the compensation of the firm's senior managers; establishing the strategic direction of the firm; and monitoring the company's financial performance and other aspects of its ongoing activities.

Board members include **inside directors** (e.g., senior executives, founders) and **independent directors** who have no material relationship with the company. While inside directors may have conflicts of interest with shareholders, independent directors may better protect shareholders' interests.

In a **one-tier board structure**, both inside and independent directors serve on a single board. Major stock exchanges specify requirements for director independence, such as that most of the board should comprise independent directors. Other requirements may include diversity of backgrounds and competencies. In continental Europe, boards have a **two-tier structure** in which the independent directors serve on a **supervisory board** that oversees a **management board** comprising inside directors.

Typically, board members are elected for a specified term (e.g., annual). In a **staggered board**, only a fraction of the board is elected each year. This decreases the power of shareholders to enact a major overhaul of the board. Firms with staggered boards justify them as providing continuity and allowing for a longer-term view of company strategy.

Senior managers typically receive compensation (remuneration) that is made up of a salary, a bonus based on some measure of company performance, and perks (e.g., expense accounts, use of company planes, special retirement benefits). Their interests can be expected to include continued employment and maximizing the total value of their compensation. Executive bonuses are typically tied to some measure of firm performance, giving senior managers a strong interest in the financial success of the firm.

Other employees are the **human capital** of the company, who provide their labor and skills. Employees also have an interest in the sustainability and success of the firm. They have interests in their rate of pay, opportunities for career advancement, training, and working conditions. Employees may hold equity in the company by participating in employee stock participation plans, which are designed to align their interests with those of the shareholders of the company. In some industries, employees join unions to negotiate the terms of their employment.

Suppliers of resources to the firm have an interest in preserving an ongoing relationship with the firm, in the profitability of their trade with the firm, and in the growth and ongoing stability of the firm. Because suppliers are typically short-term creditors of the firm, they also have an interest in the firm's solvency and ongoing financial strength.

Customers rely on the company to provide a good or service of high quality at a reasonable price. Customers may also have an interest in preserving an ongoing relationship to receive support and after-sale service. Maintaining the good will of customers is critical for the long-term prospects of any company. Customers increasingly care about environmental and social responsibilities of corporations.

Governments rely on corporations for tax revenue, economic growth, social welfare, and employment creation. Regulators have an interest in ensuring compliance with various laws.

LOS 23.c: Describe environmental, social, and governance factors of corporate issuers considered by investors.

Some debt and equity investors who take a stakeholder perspective are interested in evaluating companies' environmental, social, and governance (ESG) factors. This is

primarily due to three reasons:

1. Government stakeholders increasingly prioritize climate change and social policies through regulatory changes.
2. ESG factors can have a material impact on companies' results through potential loss of customer good will and financial losses due to fines and judgments. Poor corporate governance may lead to senior managers exploiting shareholders to advance personal interests.
3. Many younger investors increasingly manage their wealth with ESG considerations in mind.

Negative externalities arise when a company or its investors do not bear the full cost of its actions (e.g., environmental damage). Increased government regulations and stakeholder awareness necessitate companies to recognize these costs, either explicitly in their financial statements or implicitly.

Environmental Factors

Environmental factors include company contributions to problems such as climate change, air and water pollution, deforestation, energy efficiency, waste management, or water scarcity. Material environmental factors can have a substantial impact on companies' operations or business models. Industries that are natural resource intensive have a direct impact on the environment, but other industries may have indirect impacts.

With respect to climate change, companies may face **physical risk** of adverse effects on assets or operations if severe weather increases in frequency, as well as **transition risk** as government regulations or consumer choices require switching from high-carbon to low-carbon activities. **Stranded assets** are those that become unviable due to such changes. Poor safety policies or inadequate governance systems increase the risks for adverse events such as oil spills and contamination of groundwater. The costs of penalties, cleanup, litigation, and loss of reputation can be significant risks for a company's investors.

Social Factors

Social factors include the protection of customer privacy and information security, customer satisfaction, employee engagement, diversity and inclusion, labor relations, and community relations. Social factors contribute to a company's image in terms of how it treats its employees, customers, and the communities in which it operates. Taking measures to decrease social risk can reduce a company's costs through higher employee productivity, lower turnover, increased customer loyalty, and less risk of litigation.

Governance

Corporate governance encompasses factors such as the composition of the board and the internal audit committee, executive compensation, bribery and corruption, political contributions, and lobbying. Corporate governance systems should have adequate checks to ensure that managers act ethically, lawfully, and in the interests of shareholders.

Evaluation of ESG Risks

Analysts should identify and measure the ESG-related risks to which a company may be exposed and how they can affect the company's future cash flows. Equity investors bear the brunt of the risk from adverse outcomes. Debt investors have less exposure to adverse events unless they result in losses large enough to bring about default. Not all debtholders are equally exposed to ESG risks. Because some such risks may be delayed (e.g., a coal-fired electricity plant that is currently in compliance may become obsolete in the future), longer-maturity debt investors may have more exposure than short-term debt investors.



MODULE QUIZ 23.1

1. For a company that is financially sound, increasing the company's rate of growth is *most likely* to benefit:
 - A. equity holders.
 - B. debtholders.
 - C. neither debtholders nor equity holders.
2. Which of the following board structures is *most likely* to be preferred by a minority shareholder?
 - A. Majority independent and staggered elections.
 - B. Majority independent and full board election.
 - C. Majority inside and staggered elections.
3. A company decides to shut down a production plant rather than retrofit it to comply with new environmental regulations. This is *best* described as an example of:
 - A. governance factors.
 - B. social factors.
 - C. stranded assets.

KEY CONCEPTS

LOS 23.a

A company's debtholders have a higher priority of claims than its equity holders. Debtholders have a legal claim to the promised interest and principal payments. Equity holders have a residual claim to the company's net assets after debtholders have been paid.

Debt has limited upside potential because the best result for debtholders is to receive the promised principal and interest payments. Equity has theoretically unlimited upside potential. This difference may create conflicts of interest between debtholders and equity holders.

LOS 23.b

The primary stakeholders of a corporation include shareholders, debtholders, the board of directors, senior management, employees, creditors, suppliers, and government. Stakeholder theory postulates that a company needs to balance the interests of all stakeholders.

LOS 23.c

Environmental factors include company contributions to climate change, air and water pollution, deforestation, energy efficiency, waste management, and water

scarcity.

Social factors include the protection of customer privacy and information security, customer satisfaction, employee engagement, diversity and inclusion, labor relations, and community relations.

Corporate governance factors include the composition of the board, executive compensation, the internal audit function, bribery and corruption, political contributions, and lobbying.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 23.1

1. **A** If a company is financially sound, it is repaying interest and principal in full and on time. Debtholders have no additional claims to increased company profits. Equity holders benefit from the upside of a company's growth. (LOS 23.a)
2. **B** Minority shareholders prefer independent directors, as they would act in the best interests of the shareholders as opposed to acting in the interests of the management. Full board election would allow the shareholders to vote out the board if it was ineffective. Staggered elections delay changes to the board membership. (LOS 23.b)
3. **C** Stranded assets arise from obsolescence of existing assets that do not conform to new environmental standards. (LOS 23.c)

READING 24

CORPORATE GOVERNANCE: CONFLICTS, MECHANISMS, RISKS, AND BENEFITS

MODULE 24.1: CORPORATE GOVERNANCE



Video covering
this content is
available online.

LOS 24.a: Describe the principal-agent relationship and conflicts that may arise between stakeholder groups.

When one party hires another to carry out a task, the two parties are said to have a **principal-agent relationship**. In such a relationship a **principal-agent conflict** has the potential to arise, because an agent is hired to act in the interests of the principal, but an agent's interests might not coincide exactly with those of the principal.

For example, consider an insurance agent who is paid a commission on policies written. It would be in the agent's interest to write insurance policies on people or property that are not good risks to maximize commission income. The principal (the owner of the insurance company) does not want to issue policies that are bad risks, as that is a money-losing proposition. Insurance companies mitigate this conflict by imposing underwriting standards for the policies they will issue and by continuing to work only with agents who consistently act in the company's best interest.

Agency costs are the costs of a principal-agent conflict. Agency costs can be direct, such as hiring employees to monitor the agent, or indirect, such as the opportunity cost of lost business.

Conflicts of Interest Between Shareholders and Managers or Directors

In the context of a corporation, shareholders are the principals (owners), and firm management and board members (directors) are their agents. Managers and directors may choose a lower level of business risk than shareholders would. Managers have their employment income tied to the firm and stand to lose it, should the firm fail. Shareholders can diversify their portfolios cheaply, and as such might prefer that individual companies take more risk.

Conflicts may arise if inside directors favor management interests at the expense of shareholder interests, or if directors favor one group of shareholders at the expense of another. Some conflicts result from **information asymmetry** between shareholders and managers, which refers to the fact that managers have more and better information about the functioning of the firm and its strategic direction than shareholders do. This decreases the ability of shareholders or nonexecutive directors to monitor and evaluate whether managers are acting in the best interests of shareholders. Information asymmetry is more acute for larger companies that operate in many businesses and geographical markets, companies that sell complex products, and companies with lower levels of institutional ownership and free float.

Common principal-agent conflicts arise in the following ways:

- Managers may put in insufficient effort. This leads to poor evaluation of investment opportunities and risks taken, resulting in overall higher total costs.
- Managers getting option grants may want to ratchet up risk because options do not have any downside risk. On the other hand, managers who are compensated primarily with cash may be inadequately motivated to take risk.
- Manager compensation tied to company size creates incentives for *empire building* through poor or unnecessary acquisitions.
- Managers may seek to entrench themselves by taking inadequate risk, mimicking competitors' actions rather than generating original ideas, or engaging in otherwise unprofitable projects that require their specific individual knowledge. Directors, in turn, might seek to entrench themselves by going along with management's decisions instead of questioning them.
- Managers may undertake **self-dealing** by exploiting firm resources for personal benefit.

Conflicts Between Groups of Shareholders

A single shareholder or group of shareholders in a company may hold most of the votes (**controlling shareholders**) and act against the interests of the **minority shareholders**. A controlling shareholder may have concentrated ownership, in that a large proportion of his or her wealth might consist of shares in this company. In this situation a controlling shareholder might want the company to diversify into different businesses to mitigate risk. Minority shareholders, by contrast, might already hold diversified portfolios and do not want the company to squander resources by investing in a less desirable business just to diversify.

Some firms have a **dual-class structure** with different classes of common stock outstanding, some with more voting power than others. This can give a group of shareholders (e.g., the company's founders) effective control of the company even if they have claims to less than 50% of its earnings and assets. CFA Institute advocates against dual-class voting structures because they allow one group of shareholders to further their interests at the expense of other groups.

Conflicts of Interest Between Creditors and Shareholders

Shareholders may prefer more business risk than creditors do because creditors have a limited upside from good results compared to shareholders. Management actions that favor the interests of equity owners over the interests of creditors include issuing new debt that increases the default risk faced by existing debtholders, or increasing dividends at the cost of decreasing company assets as collateral and increasing the risk of default. This potential for conflict is a greater risk for long-term debtholders.

LOS 24.b: Describe corporate governance and mechanisms to manage stakeholder relationships and mitigate associated risks.

Corporate governance is the system of internal controls and procedures by which individual companies are managed. It includes a framework that defines the rights, roles, and responsibilities of various groups within an organization. The objective is to manage and minimize conflicts of interest between stakeholders of the company.

Stakeholder management refers to the management of company relations with stakeholders and is based on having a good understanding of stakeholder interests and maintaining effective communication with stakeholders. With respect to the company's relationship with shareholders, there are standard practices. These practices are required by corporate laws and are similar in many jurisdictions, although there are some differences across countries.

Stakeholders gather information about the company from public reports filed by the company. Public companies release information in annual reports, proxy statements, and public notices. This reporting includes information about the financial performance and standing of the company, related-party transactions, executive remuneration, and governance structure. While reporting requirements for private companies are more limited, these companies typically provide information to their investors directly. Transparency in reporting reduces information asymmetry and allows stakeholders to evaluate whether the company's actions align with their interests.

Stakeholder Mechanisms

Corporations typically hold an **annual general meeting** after the end of the firm's fiscal year. At the general meeting, company management provides shareholders with the audited financial statements for the year, addresses the company's performance and significant actions over the period, and answers shareholder questions.

Corporate laws dictate when the annual general meeting must occur and how the meeting must be communicated to shareholders. Typically, anyone owning shares is permitted to attend the annual general meeting, to speak or ask questions, and to vote their shares. A shareholder who does not attend the annual general meeting can vote her shares by **proxy**, meaning she assigns her right to vote to another person who will attend the meeting—often a director, a member of management, or the shareholder's investment advisor. A proxy may specify the shareholder's vote on specific issues or leave the vote to the discretion of the person to whom the proxy is assigned.

Ordinary resolutions, such as the approval of an auditor and the election of directors, require a simple majority of the votes cast. Other resolutions are addressed at **extraordinary general meetings**, which can be called any time a matter requires a shareholder vote. Examples include amendments to the company's bylaws, a merger or takeover, a shareholder-proposed special board election, or the liquidation of the firm.

Activist shareholders pressure companies in which they hold a significant number of shares for changes they believe will increase shareholder value. They may initiate shareholder lawsuits or seek representation on the board of directors. Other activist tactics include proposing shareholder resolutions for a vote and raising their issues to all shareholders or the public to gain wider support. Hedge funds have engaged increasingly in shareholder activism at firms in which they hold significant stakes.

A shareholder activist group may initiate a **proxy contest**, in which they seek the proxies of shareholders to vote in favor of their alternative proposals, or may make a **tender offer** for enough shares of a company to gain control. Both senior managers and boards of directors can be replaced by shareholders when they believe company performance is poor and would be improved by change. The threat of a **hostile takeover**, one not supported by the company's management, can act as an incentive for company managements and boards to pursue policies better aligned with the interests of shareholders. On the other hand, it might also cause the current management or board to adopt takeover defenses such as staggered board elections or **poison pill** provisions (low-price additional share offerings to current shareholders).

Creditor Mechanisms

When a company issues a bond, it specifies the rights of bondholders and the company's obligations in a legal document called a **bond indenture**. An indenture typically includes **covenants** that may require the company to take certain actions, or restrict it from taking certain actions. A bond can be backed by **collateral**, which is a specific asset pledged against which the bondholders will have a claim if the company defaults on the bond. A financial institution may act as a trustee to monitor the company's compliance with its bond covenants.

Creditor committees may form among bondholders to protect their interests when an issuer experiences financial distress. Some countries require such committees when a company files for bankruptcy. A group of bond investors may form an **ad hoc committee** when a company is struggling to meet its obligations. While the committee does not represent *all* the bondholders, their interests are generally aligned.

Board of Directors and Management Mechanisms

The **board of directors** is elected by shareholders to act in their interests. A board of directors typically has committees made up of board members with particular expertise. These committees report to the board, which retains the overall responsibility for the various board functions. The following are examples of typical board committees.

An **audit committee** is responsible for the following:

- Oversight of the financial reporting function and implementation of accounting policies
- Effectiveness of the company's internal controls and the internal audit function
- Recommending an independent external auditor and its compensation
- Proposing remedies based on their review of internal and external audits

A **nominating/governance committee** is responsible for the following:

- Oversight of the company's corporate governance code including board elections
- Setting policies for nomination of candidates for board membership
- Implementing the company's code of ethics and policies regarding conflicts of interest
- Monitoring changes in relevant laws and regulations
- Ensuring that the company is in compliance with all applicable laws and regulations, as well as with the company's governance policies

A **compensation committee** or **remuneration committee** recommends to the board the amounts and types of compensation to be paid to directors and senior managers. This committee may also be responsible for oversight of employee benefit plans and evaluation of senior managers. Because managers should not be in a position to evaluate or compensate themselves, a compensation committee should (and in many countries is required to) be composed of independent directors only.

Other committees are industry specific. A risk committee (financial services industry) informs the board about appropriate risk policy and risk tolerance of the organization, and it oversees the enterprise-wide risk management processes of the organization. An investment committee (insurance industry) reviews and reports to the board prudent investment and capital management policies.

The number and size of board committees will depend on the size, complexity, and nature of the business. Regulations often require that firms have audit committees. The composition of a board committee is often based on its function, with audit committees, compensation committees, and governance committees often made up of only nonexecutive or independent directors.

Employee, Customer, and Supplier Mechanisms

Labor laws, employment contracts, and the right to form unions are the primary mechanisms for employees to manage relationships with employers. Some countries have laws that require boards of large companies to include employee representatives. **Employee stock ownership plans (ESOPs)** may help align company and employee interests. For customers and suppliers, contracts tend to be the mechanism through which they manage their relationships with companies. In recent years, customers and other stakeholders have increasingly used social media as a mechanism to influence company behavior.

Government Mechanisms

Governments enact and enforce regulations that govern companies' actions. They often do so by establishing agencies to regulate industries or sectors such as financial markets, or by monitoring specific issues such as workplace safety and

environmental protection. In some countries, regulators develop corporate governance codes that companies must either adopt or explain why they have not done so. In some countries, corporate governance regulations are specified by stock exchanges as part of their listing requirements.

LOS 24.c: Describe potential risks of poor corporate governance and stakeholder management and benefits of effective corporate governance and stakeholder management.

Risks of Poor Governance and Stakeholder Management

When corporate governance is weak, the control functions of audits and board oversight may be weak as well. The risk is that some stakeholders can gain an advantage, to the disadvantage of other stakeholders. Accounting fraud, or simply poor recordkeeping, will have negative implications for company performance and value.

When governance is weak and managers are not monitored, they may serve their own interests by choosing less-than-optimal risk, reducing company value. Without proper monitoring and oversight, management may be given incentive compensation that allows them to pursue their own benefit rather than the company's interests. They may engage in related-party transactions that benefit their friends or family, to the detriment of shareholders.

Poor compliance procedures with respect to regulation and reporting can easily lead to legal and reputational risks. Violating stakeholder rights can lead to stakeholder lawsuits. Failure to comply with government regulations can damage company reputation. Failure to manage creditors' rights well can lead to debt default and bankruptcy.

Benefits of Effective Governance and Stakeholder Management

Effective corporate governance can improve operational efficiency by ensuring that management and board member incentives align their interests well with those of the shareholders. Effective governance implies effective control and monitoring. Just as weak control can lead to abuses, a strong system of controls and compliance with laws and regulations can avoid many legal and regulatory risks.

Formal policies regarding conflicts of interest and related-party transactions can also lead to better operating results. Proper governance with respect to the interests of creditors can reduce the risk of debt default or bankruptcy, thereby reducing the cost of debt financing. Alignment of management interests with those of shareholders leads to better financial performance and greater company value.



MODULE QUIZ 24.1

1. Between which two of a company's stakeholder groups does information asymmetry *most likely* make monitoring more difficult?

- A. Suppliers and customers.
 - B. Employees and government.
 - C. Managers and shareholders.
2. The theory that deals with conflicts of interest between a company's owners and its creditors is *most appropriately* called:
- A. governance theory.
 - B. stakeholder theory.
 - C. shareholder theory.
3. Benefits of effective corporate governance and stakeholder management *most likely* include:
- A. reduced risk of default.
 - B. more efficient related-party transactions.
 - C. greater control exercised by the most interested stakeholders.

KEY CONCEPTS

LOS 24.a

The principal-agent relationship refers to owners employing agents to act in their interests. Conflicts can arise because the agent's incentives may not align with those of the owner or, more generally, because the interests of one group within a corporation are not the same as those of other groups.

LOS 24.b

Corporate governance refers to the internal controls and procedures of a company that delineate the rights and responsibilities of various groups, and how conflicts of interest among the various groups are to be resolved.

Shareholders, creditors, boards of directors, employees, customers, suppliers, and governments have different mechanisms with which to manage their stakeholder relationships with companies.

Proxy voting is the primary shareholder mechanism. Shareholders can remove senior managers and boards of directors if they believe company performance would improve with a change. Activist shareholders may engage in proxy fights or hostile takeovers.

Creditor mechanisms include bond indentures and creditor committees. Employee mechanisms include labor laws and unions. Contracts are the primary mechanism for customers and suppliers. Governments may enact regulations or appoint regulatory agencies.

Duties of a board of directors include the following:

- Selecting senior management, setting their compensation, and evaluating their performance
- Setting the strategic direction for the company
- Approving capital structure changes, significant acquisitions, and large investment expenditures
- Reviewing company performance and implementing any necessary corrective steps
- Planning for continuity of management and the succession of the CEO

- Establishing, monitoring, and overseeing the firm's internal controls and risk management
- Ensuring the quality of the firm's financial reporting and internal audit

LOS 24.c

The risks of poor governance include weak control systems, poor decision-making, legal risk, reputational risk, and default risk. Good corporate governance can improve operational efficiency and performance, reduce default risk, reduce the cost of debt, improve financial performance, and increase firm value.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 24.1

1. **C** Information asymmetry can exist between a company's shareholders and its managers because the company's managers may be much more knowledgeable about the company's functioning and strategic direction. This makes it more difficult for shareholders to monitor the firm's managers and determine whether they are acting in shareholders' interests. (LOS 24.a)
2. **B** Stakeholder theory focuses on the conflicts of interest among owners and several groups that have an interest in a company's activities, including creditors. (LOS 24.b)
3. **A** Reduced risk of default is among the benefits of effective corporate governance. Risks from poor corporate governance include related-party transactions by managers and opportunities for some stakeholder groups to gain an advantage at the expense of others. (LOS 24.c)

READING 25

WORKING CAPITAL AND LIQUIDITY

MODULE 25.1: LIQUIDITY MEASURES AND MANAGEMENT

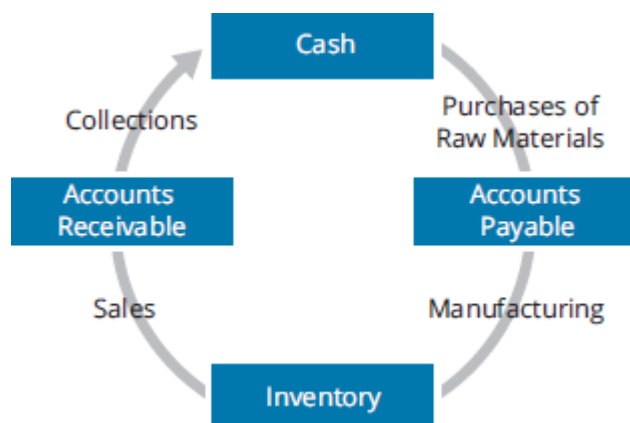


Video covering this content is available online.

LOS 25.a: Explain the cash conversion cycle and compare issuers' cash conversion cycles.

The **cash conversion cycle (CCC)** measures the efficiency of a company's cash flow management. It represents the time it takes for a company to convert its investments in inventory and other resources into cash inflows from sales. In other words, it measures how quickly a company can convert its investments into cash and then use that cash to invest in new opportunities, as shown in Figure 25.1.

Figure 25.1: Cash Conversion Cycle



The CCC is calculated by adding the number of days it takes for a company to sell its inventory (**days of inventory on hand**), the number of days it takes for the company to collect payment from its customers (**days sales outstanding**), and the number of days it takes for the company to pay its suppliers (**days payable outstanding**).

cash conversion cycle = days of inventory on hand + days sales outstanding - days payables outstanding



PROFESSOR'S NOTE

The calculation of DOH, DSO, and DPO is covered in our Financial Statement Analysis reading on Financial Analysis Techniques.

A lower CCC is generally better as it indicates that a company can generate cash quickly and efficiently, meaning that less of the company's capital is devoted to working capital. A high CCC may indicate that a company is taking longer to convert its investments into cash, which could lead to cash flow problems and potentially limit the company's ability to invest in growth opportunities.

A company can decrease its CCC by decreasing its inventories and receivables or by increasing (extending) its payables. However, each of these has potential disadvantages:

- Reduced inventories of raw materials may create production bottlenecks due to supply chain disruptions. Reduced inventories of finished goods may mean an inability to meet spikes in customer demand.
- Reducing or tightening credit to customers may result in lost sales.
- We can think of accounts payable as an implicit source of credit from suppliers (as opposed to explicit sources such as bank loans). Suppliers offer payment terms in the form *a/b net c*, which means a percentage discount of *a* if the invoice is paid within *b* days, otherwise full payment is due within *c* days. Forgoing the discount for prompt payment amounts to borrowing money from the supplier for (*c* - *b*) days, at an effective annual rate we can calculate as follows:

$$\text{EAR of supplier financing} = \left(1 + \frac{a}{1-a}\right)^{\left(\frac{365}{c-b}\right)} - 1$$

where:

a = percent discount

b = days until discount expires

c = days until full payment is due

Often, the company could find a lower EAR by borrowing from their lenders as opposed to forgoing the discount.

EXAMPLE: EAR of supplier financing

A supplier offers 2/10 net 30 terms. The bank interest rate is 8%. Which source of financing should the company prefer?

Answer:

Financing is for 30 - 10 = 20 days.

EAR of supplier financing = $(1 + 0.02 / 0.98)^{(365/20)} - 1 = 0.446$, or 44.6%.

The cost of implicit supplier financing is much higher than the cost of explicit bank financing. The company should borrow from its bank at 8% to pay the invoice within 10 days.

Cash conversion cycles vary by industry. For example, pharmaceutical companies have long CCCs because they maintain inventories of high-margin drugs to meet unexpected surges in demand. By contrast, airlines have low CCCs because most of their sales are prepaid and they do not keep significant inventories. Analysts should

use the CCC to compare companies within the same industry, or to track a company's performance over time.

In addition to the CCC, overall levels of working capital can indicate how efficiently a company manages its liquidity. To compare companies of different sizes, analysts calculate working capital as a proportion of sales. Because the ratio varies by industry, care should be taken to compare firms in similar lines of business. **Total working capital** is current assets less current liabilities. Analysts often prefer to measure **net working capital**, using only operating current assets and operating current liabilities, because it is closely linked to the CCC:

$$\text{total working capital} = \text{current assets} - \text{current liabilities}$$
$$\text{net working capital} = \text{current assets (except cash and marketable securities)} \\ - \text{current liabilities (excluding short-term and current debt)}$$

LOS 25.b: Explain liquidity and compare issuers' liquidity levels.

For an asset, **liquidity** refers to its nearness to cash. For a liability, liquidity refers to its nearness to settlement. Assets that can be quickly converted to cash (e.g., marketable securities) are considered highly liquid.

Inventory is less liquid than accounts receivable. Inventory may need processing before a sale, and once sold, inventory might be converted to accounts receivable, which needs to be collected to convert into cash.

For a corporate issuer, liquidity refers to availability of cash and other liquid assets to meet its short-term obligations. **Primary liquidity sources** include cash and marketable securities on hand, bank borrowings, and cash generated from the business. Long-term solvency of a company depends on its ability to generate sufficient cash from its business to service its liabilities. Analysts evaluate a company's liquidity management primarily by reviewing its statement of cash flows.

Companies generally rely on primary sources of liquidity. However, if needed, the company can rely on **secondary liquidity sources**, such as the following:

- Cash saved by suspending dividends to shareholders
- Delaying or reducing capital investments
- Selling assets
- Issuing additional equity
- Restructuring debt to extend its maturity
- Bankruptcy protection filing, which suspends the need to service the liabilities

Using secondary liquidity sources sends negative signals to the market, and they are generally more costly than primary liquidity sources.

A company's cash conversion cycle may vary by time of the year (i.e., seasonality) and as business conditions change (e.g., a sudden dip in demand for a company's product will increase inventory and increase DOH). Cash and marketable securities serve as a buffer to meet the company's obligations when there is a deviation from the normal CCC. This excess cash has a cost because it represents capital not

invested in the business, but inadequate liquidity can result in having to rely on higher-cost secondary sources.

EXAMPLE: Cost of liquidity

Drake Corporation has a sudden need for liquidity to meet its payroll at the end of the week. The company's sources of liquidity and their costs are as shown here.

Source	\$ Fair Market Value (\$000s)	Liquidation Cost (%)
Cash and marketable securities	100	0
Inventory and receivables	200	15
Empty warehouse	<u>300</u>	30
Total	<u>600</u>	

Calculate the total proceeds from all sources, and the cost of liquidity in dollars and in percentage.

Answer:

The cost of liquidity is the discount to fair market value for which an asset is sold due to the need for immediate liquidity, rather than waiting for the normal time it takes to sell the asset.

Source	Fair Market Value (\$000s)		Liquidation Cost	Net Proceeds
Cash and marketable securities	\$100	0%	\$0	\$100
Inventory and receivables	\$200	15%	\$30	\$170
Empty warehouse	<u>\$300</u>	30%	<u>\$90</u>	<u>\$210</u>
Total	<u>\$600</u>		<u>\$120</u>	<u>\$480</u>

The cost of liquidity = \$120,000, or $120 / 600 = 20\%$.

Factors Affecting Liquidity

An increase in the CCC reduces an issuer's liquidity. The CCC can increase due to drags or pulls on liquidity. A **drag on liquidity** occurs when cash inflows lag. This can occur when excess inventory builds up or inventory becomes obsolete (DOH increases), or when collections are slow or receivables become uncollectible (DSO increases). A **pull on liquidity** occurs when cash outflows accelerate. This can occur when suppliers reduce credit lines or demand faster payments (DPO decreases).

Liquidity Ratios

The **current ratio** is the ratio of current assets to current liabilities. A current ratio greater than 1 indicates that the company has sufficient current assets to meet its current liabilities.

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

Not all current assets are equally liquid. Because inventory is the least liquid current asset, the **quick ratio** excludes inventory from current assets and is a more stringent metric of liquidity.

$$\text{quick ratio} = \frac{\text{cash and marketable securities} + \text{accounts receivable}}{\text{current liabilities}}$$

Finally, the **cash ratio** excludes both inventory and accounts receivables and is the most stringent measure of liquidity.

$$\text{cash ratio} = \frac{\text{cash and marketable securities}}{\text{current liabilities}}$$

EXAMPLE: Liquidity ratios

The following information is available for Drake Corporation for the past two years:

	20X1	20X2
Current Assets	(\$000s)	(\$000s)
Cash and marketable securities	\$ 98	\$ 54
Accounts receivable	\$ 120	\$ 110
Inventory	\$ 190	\$ 310
Prepaid accounts	\$ 24	\$ 18
Current Liabilities		
Accounts payable	\$ 85	\$ 100
Accrued expenses	\$ 34	\$ 39
Short-term notes payable	\$ 98	\$ 145

Calculate Drake's current ratio, quick ratio, and cash ratio for each of the two years and comment on the trend in the ratios.

Answer:

Current ratio = current assets / current liabilities

Current ratio (20X1) = $(98 + 120 + 190 + 24) / (85 + 34 + 98) = 1.99$

Current ratio (20X2) = $(54 + 110 + 310 + 18) / (100 + 39 + 145) = 1.73$

Quick ratio = cash and marketable securities + accounts receivable / current liabilities

Quick ratio (20X1) = $(98 + 120) / (85 + 34 + 98) = 1.00$

Quick ratio (20X2) = $(54 + 110) / (100 + 39 + 145) = 0.58$

Cash ratio = cash and marketable securities / current liabilities

Cash ratio (20X1) = $98 / (85 + 34 + 98) = 0.45$

Cash ratio (20X2) = $54 / (100 + 39 + 145) = 0.19$

All three ratios are declining year-over-year from 20X1 to 20X2, indicating that Drake's liquidity is worsening.

LOS 25.c: Describe issuers' objectives and compare methods for managing working capital and liquidity.

Working capital management seeks to maximize firm profits while ensuring that sufficient liquidity is available to maintain the firm's operations and meet its obligations. Firms may choose to hold more short-term assets (which offer lower rates of return) to ensure that sufficient cash is available to service its obligations. The firm can also choose to finance its working capital using short-term loans, which are cheaper than sources such as long-term debt and equity. However, the firm must consider the risk of being able to roll over short-term debt at a reasonable cost.

In analyzing different approaches to working capital management, it is important to control for size differences between companies. We do this by calculating companies' relative amounts of long-term versus short-term assets as a proportion of sales.

A conservative approach to working capital management is for the company to hold higher amounts of short-term assets (relative to long-term assets) and finance the working capital using longer-term sources, such as long-term debt and equity. Benefits of a conservative approach include using more permanent capital with less need for rolling over; greater flexibility during market disruptions; and a high probability of meeting short-term obligations. However, the conservative approach results in higher costs and lower profitability. Additionally, long-term lenders may impose operational constraints such as a minimum interest coverage ratio.

An aggressive approach would be to hold relatively lower levels of short-term assets and finance working capital using short-term debt. The benefit of an aggressive approach is lower costs, but its risks are failing to meet business obligations and vulnerability to market disruptions.

A moderate approach seeks to find a middle ground. Permanent current assets are funded using long-term sources of capital, while variable (seasonal) current assets are funded using short-term sources.

Short-Term Liquidity Sources

Firms should maintain a variety of alternative sources and evaluate the costs of each source, while securing sources ahead of time to meet spikes in liquidity needs.

Factors that affect a firm's approach to short-term funding include the following:

- Company size (smaller firms have limited options)
- Creditworthiness (which affects the interest rate on loans as well as operational restrictions imposed)
- Legal systems (developed economies with well-defined protections for lenders offer more funding alternatives)
- Regulatory concerns (firms in regulated industries, such as banks and utilities, have restrictions on funding sources as well as amounts raised)
- Underlying assets (that serve as collateral on loans)



MODULE QUIZ 25.1

1. Compared to its industry peers, a company with a shorter cash conversion cycle *most likely*:

- A. has more inventory.
 - B. has less accounts receivable.
 - C. pays its suppliers more promptly.
2. A company receives an invoice of \$150,000 for machine tools with terms of "1.5/15 net 40." The cost to the company of delaying payment of this receivable is *most* appropriately described as \$2,250 for the use of:
 - A. \$150,000 for 40 days.
 - B. \$150,000 for 25 days.
 - C. \$147,750 for 25 days.
 3. Which of the following actions is *most likely* to increase liquidity for a corporation?
 - A. Selling inventory at a discount of 5%.
 - B. Availing of a discount of 10% by paying accounts payable early.
 - C. Extending customers' credit terms from 90 days to 120 days.
 4. Which of the following is *least likely* a primary source of liquidity?
 - A. Borrowings from banks.
 - B. Cash flow from operations.
 - C. Delaying capital expenditures.
 5. Which of the following *most likely* represents conservative working capital management?
 - A. Decreasing inventory on hand to reduce insurance costs.
 - B. Financing an increase in receivables by increasing long-term borrowing.
 - C. Selling marketable securities and using the proceeds to acquire real estate.

KEY CONCEPTS

LOS 25.a

The cash conversion cycle (CCC) represents the time it takes for a company to convert its investments in inventory and other resources into cash inflows from sales. The CCC increases with an increase in days of inventory on hand (DOH), days sales outstanding (DSO), and decreases with an increase in days payable outstanding (DPO).

$$\text{CCC} = \text{DOH} + \text{DSO} - \text{DPO}$$

$$\text{Total working capital} = \text{current assets} - \text{current liabilities}$$

$$\text{Net working capital} = \text{current assets (except cash and marketable securities)} \\ - \text{current liabilities (excluding short-term and current debt)}$$

LOS 25.b

Primary liquidity sources include cash and marketable securities on hand, bank borrowings, and cash generated from the business. Secondary sources of liquidity include forgoing dividends, delaying capital investments, selling assets, issuing equity, restructuring debt, and bankruptcy protection filing. Using secondary liquidity sources sends a negative signal to the market and incurs a cost of liquidity.

A drag on liquidity occurs when cash inflows lag (DOH or DSO increases), while a pull on liquidity occurs when cash outflows accelerate (DPO decreases).

Measures of a company's short-term liquidity include:

- Current ratio = current assets / current liabilities.
- Quick ratio = (cash + marketable securities + receivables) / current liabilities.

- Cash ratio = (cash + marketable securities) / current liabilities.

LOS 25.c

A conservative approach to working capital management involves high levels of current assets financed with long-term debt and equity. Compared to a more aggressive approach, a conservative approach provides more liquidity and involves less financial risk, but has higher financing costs and reduces returns.

An aggressive approach to working capital management involves lower levels of current assets and financing working capital needs with short-term debt. Compared to a more conservative approach, an aggressive approach typically has lower financing costs and results in higher returns, but decreases liquidity and increases financial risk.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 25.1

1. **B** $CCC = DOH + DSO - DPO$. A company with a shorter CCC would have lower DOH (lower amount of cash tied in inventory), lower DSO (lower amount of cash tied in accounts receivables), or higher DPO (increased use of supplier credit). (LOS 25.a)
2. **C** The terms indicate that the company can pay $\$150,000(1 - 0.015) = \$147,750$ on day 15 (after the invoice date) or pay \$150,000 on day 40—effectively gaining the use of \$147,750 for 25 days at a cost of \$2,250. (LOS 25.a)
3. **A** Liquidity can be increased by reducing inventory. Extending repayment times would increase DSO, reducing liquidity. Paying suppliers earlier decreases DPO, thus reducing liquidity. (LOS 25.b)
4. **C** Primary sources of liquidity include cash and marketable securities on hand, bank borrowings, and cash generated from the business. Delaying capital expenditure is a secondary source of liquidity. (LOS 25.b)
5. **B** Financing an increase in a current asset with long-term borrowing is an example of conservative working capital management. The other choices describe decreases in current assets and therefore more likely represent aggressive working capital management. (LOS 25.c)

READING 26

CAPITAL INVESTMENTS AND CAPITAL ALLOCATION

MODULE 26.1: CAPITAL INVESTMENTS AND PROJECT MEASURES



Video covering this content is available online.

LOS 26.a: Describe types of capital investments.

The four types of capital investments include going concern projects, regulatory/compliance projects, expansion projects, and other projects.

- **Going concern projects** may be needed to maintain the business or reduce costs. Projects that maintain the business do not require detailed analysis. The only issues are whether the existing operations should continue and, if so, whether existing procedures or processes should be maintained. Projects to improve efficiency may involve determining if equipment that is obsolete, but still usable, should be replaced. To reduce financing risk, companies often use a **match funding** approach, financing projects with capital sources that are consistent with the project life. Analysts often use a company's annual depreciation expense as an estimate of the capital investment it needs for going concern projects.
- **Regulatory/compliance projects** may be required by a government agency or insurance company and often involve safety-related or environmental concerns. These projects typically generate little to no revenue and require the company to evaluate alternative ways of carrying out the projects.
- **Expansion projects** grow the business and require a complex decision-making process that includes forecasting future demand. Expansion projects can involve entering new markets or introducing new products within the same market. A detailed analysis including forecasting revenues and expenses is required.
- Other projects, such as new investments outside a company's existing lines of business, also entail a complex decision-making process with detailed analysis due to the uncertainty involved. Other projects are often similar to startups that explore a new technology or business idea. These projects can also involve buying out an existing company in a new industry, which involve risks that include overpaying.

LOS 26.b: Describe the capital allocation process, calculate net present value (NPV), internal rate of return (IRR), and return on invested capital (ROIC),

and contrast their use in capital allocation.

The **capital allocation process** is identifying and evaluating capital projects (i.e., projects where the cash flows to the firm will be received over a period longer than a year). Any corporate decisions with an impact on future earnings can be examined using this framework. Decisions about buying a new machine, expanding business into another geographic area, moving the corporate headquarters to Cleveland, or replacing a delivery truck, to name a few, can be examined using a capital allocation analysis.

For a number of good reasons, capital allocation may be the most important responsibility that a financial manager has. First, because a capital allocation decision often involves the purchase of costly long-term assets with lives of many years, the decisions made may determine the future success of the firm. Second, the principles underlying the capital allocation process also apply to other corporate decisions, such as working capital management and making strategic mergers and acquisitions. Finally, making good capital allocation decisions is consistent with management's primary goal of maximizing shareholder value.

The capital allocation process has four administrative steps:

- Step 1: Idea generation.* The most important step in the capital allocation process is generating good project ideas. Ideas can come from a number of sources, including senior management, functional divisions, employees, or sources outside the company.
- Step 2: Analyzing project proposals.* Because the decision to accept or reject a capital project is based on the project's expected future cash flows, a cash flow forecast must be made for each project to determine its expected profitability.
- Step 3: Create the firm-wide capital budget.* Firms must prioritize profitable projects according to the timing of the project's cash flows, available company resources, and the company's overall strategic plan. Many projects that are attractive individually may not make sense strategically.
- Step 4: Monitoring decisions and conducting a post-audit.* It is important to follow up on all capital allocation decisions. An analyst should compare the actual results to the projected results, and project managers should explain why projections did or did not match actual performance. Because the capital allocation process is only as good as the estimates of the inputs into the model used to forecast cash flows, a post-audit should be used to identify systematic errors in the forecasting process and improve company operations.

Net Present Value (NPV)

Net present value (NPV) is the sum of the present values of all the expected incremental cash flows if a project is undertaken. The discount rate used is the firm's cost of capital, adjusted for the risk level of the project. For a normal project, with an initial cash outflow followed by a series of expected after-tax cash inflows, the NPV is the present value of the expected inflows minus the initial cost of the project.

$$NPV = CF_0 + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \dots + \frac{CF_n}{(1+k)^n} = \sum_{t=0}^n \frac{CF_t}{(1+k)^t}$$

where:

CF_0 = initial investment outlay (a negative cash flow)

CF_t = after-tax cash flow at time t (can be positive or negative)

k = required rate of return for project

A positive NPV project is expected to increase shareholder wealth, a negative NPV project is expected to decrease shareholder wealth, and a zero NPV project has no expected effect on shareholder wealth.

For *independent* projects, the *NPV decision rule* is simply to accept any project with a positive NPV and to reject any project with a negative NPV.

EXAMPLE: Net present value

Using the project cash flows presented in Figure 26.1, calculate the NPV of the project and determine whether it should be accepted or rejected. Assume that the cost of capital is 9%.

Figure 26.1: Expected Net After-Tax Cash Flows

Year	Cash Flow
0	-\$100
1	25
2	50
3	75

Answer:

$$NPV = -100 + \frac{25}{1.09} + \frac{50}{(1.09)^2} + \frac{75}{(1.09)^3} = 22.93$$

The project has a positive NPV, so it should be accepted.

You may calculate NPV directly by using the cash flow (CF) keys on your calculator. The process is illustrated in Figure 26.2.

Figure 26.2: Calculating NPV With the TI BA II Plus™

Keystrokes	Explanation	Display
[CF] [2nd] [CLR WORK]	Clear memory registers	CF0 = 0.0000
100 [+/-] [ENTER]	Initial cash outlay	CF0 = -100.0000
[↓] 25 [ENTER]	Period 1 cash flow	C01 = 25.0000
[↓]	Frequency of cash flow 1	F01 = 1.0000
[↓] 50 [ENTER]	Period 2 cash flow	C02 = 50.0000
[↓]	Frequency of cash flow 2	F02 = 1.0000
[↓] 75 [ENTER]	Period 3 cash flow	C03 = 75.0000
[↓]	Frequency of cash flow 3	F03 = 1.0000
[NPV] 9 [ENTER]	9% discount rate	I = 9.0000
[↓] [CPT]	Calculate NPV	NPV = 22.9335

Internal Rate of Return (IRR)

For a normal project, the **internal rate of return (IRR)** is the discount rate that makes the present value of the expected incremental after-tax cash inflows just equal to the initial cost of the project. More generally, the IRR is the discount rate that makes the present value of a project's estimated cash inflows equal to the present value of the project's estimated cash outflows. That is, IRR is the discount rate that makes the following relationship hold:

$$\text{PV inflows} = \text{PV outflows}$$

The IRR is also the discount rate for which the NPV of a project is equal to zero:

$$\text{NPV} = 0 = \text{CF}_0 + \frac{\text{CF}_1}{(1+\text{IRR})^1} + \frac{\text{CF}_2}{(1+\text{IRR})^2} + \dots + \frac{\text{CF}_n}{(1+\text{IRR})^n} = \sum_{t=0}^n \frac{\text{CF}_t}{(1+\text{IRR})^t}$$

IRR decision rule: If IRR is greater than the required rate of return, accept the project. If IRR is less than the required rate of return, reject the project.

The required rate of return for a given project is usually the firm's cost of capital. However, a project analyst may adjust the required rate of return above or below the firm's cost of capital to account for differences between the project's risk and the average risk of all of the firm's projects (which is reflected in the firm's current cost of capital).

For this reason, the minimum IRR above which a project will be accepted is often referred to as the **hurdle rate**. Projects with IRRs above this rate will be accepted, while those with IRRs below this rate will not be accepted.

EXAMPLE: Internal rate of return

Continuing with the cash flows presented in Figure 26.1 for the previous example, calculate the IRR of the project and determine whether it should be accepted or rejected. Assume that the required rate of return is 9%.

Answer:

$$0 = -100 + \frac{25}{(1+\text{IRR})} + \frac{50}{(1+\text{IRR})^2} + \frac{75}{(1+\text{IRR})^3}$$

The cash flows should be entered as in Figure 26.2 (if you haven't changed or cleared them, they are still there from the previous calculation of NPV).

With the TI calculator, the IRR can be calculated with [IRR] [CPT] to get 19.4377%.

The project should be accepted because its IRR is greater than the 9% required rate of return.

A project has a **conventional cash flow pattern** if the sign on the cash flows changes only once, with one or more cash outflows followed by one or more cash inflows. An **unconventional cash flow pattern** has more than one sign change. For example, a project might have an initial investment outflow, a series of cash inflows, and a cash outflow for asset retirement costs at the end of the project's life. Another example of unconventional cash flow is when the time intervals between cash flows differ, for example if the first cash flow occurs 1 year after project inception while

the second cash flow occurs 1.5 years after the first. Spreadsheet software is most suitable for calculating NPV and IRR with unconventional cash flows.

Relative Advantages and Disadvantages of the NPV and IRR Methods

A key advantage of NPV is that it is a direct measure of the expected increase in the value of the firm. In theory, a positive NPV project should cause a proportionate increase in a company's stock price.

A key advantage of IRR is that it measures profitability as a percentage, showing the return on each dollar invested. The IRR provides information on the margin of safety that the NPV does not. From the IRR, we can tell how much below the IRR (estimated return) the actual project return could fall, in percentage terms, before the project becomes uneconomic (has a negative NPV).

The *disadvantages* of the IRR method are:

- It assumes that project's cash flows are reinvested at the IRR while NPV assumes that those cash flows are reinvested at the project's required rate of return. It is more realistic to assume the latter.
- For multiple sign changes, a project may have multiple IRRs that are difficult to interpret.

Return on Invested Capital

One way to examine whether a company is creating value for its shareholders is to compare the return on the company's investment in assets to its cost of capital. A company's **return on invested capital (ROIC)**, or simply **return on capital**, is defined as its **net operating profit after tax (NOPAT)**, or simply after-tax net profit, divided by the average book value of its total capital over the period:

$$\text{return on invested capital} = \frac{\text{net operating profit after tax}}{\text{average book value of total capital}}$$

After-tax operating profit is net income plus after-tax interest expense. We use this because we want to measure the return to all sources of capital (both debt and equity). The denominator is the sum of the average book values of debt and equity.

We can rewrite the ROIC equation as:

$$\text{ROIC} = \left(\frac{\text{NOPAT}}{\text{Average Invested Capital}} \right) = \left(\frac{\text{NOPAT}}{\text{Sales}} \right) \times \left(\frac{\text{Sales}}{\text{Average Invested Capital}} \right)$$

We refer to the ratio of after-tax operating profit to sales as *operating margin after tax*, and we refer to the ratio of sales to invested capital as *capital turnover* or *asset turnover*. This means that ROIC is the product of operating margin after-tax and invested capital turnover. A company can increase its ROIC by improving its operating margin or by increasing its capital turnover.

Analysts compare ROIC to investors' required rate of return. In this context, the required rate of return is a blended rate for both debt and equity. If ROIC is greater than the required rate, the firm is adding value over time.

One attraction of ROIC is that it is based on accounting data, which are available to outside investors. While NPV and IRR are project-specific, ROIC is for the firm as a whole. ROIC is more relevant for outside investors because they typically cannot invest in a firm's individual projects.

There are three concerns with using ROIC:

1. Because accounting treatments differ, ROIC may not be comparable across companies.
2. ROIC is backward-looking and can be volatile from year to year.
3. Because ROIC is for the whole company, it may let profitable projects and good decisions mask unprofitable projects and poor decisions.



MODULE QUIZ 26.1

1. Which of the following is *most likely* a going concern project?
 - A. Opening a retail outlet in a new region.
 - B. Acquiring and merging with a supplier to secure a source for a key component.
 - C. Purchasing a new model of a factory machine that will decrease unit production costs.
2. In the capital allocation process, a post-audit is used to:
 - A. improve cash flow forecasts and stimulate management to improve operations and bring results into line with forecasts.
 - B. improve cash flow forecasts and eliminate potentially profitable but risky projects.
 - C. stimulate management to improve operations, bring results into line with forecasts, and eliminate potentially profitable but risky projects.
3. A company is considering the purchase of a copier that costs \$5,000. Assume a required rate of return of 10% and the following cash flow schedule:
 - Year 1: \$3,000.
 - Year 2: \$2,000.
 - Year 3: \$2,000.The project's NPV is *closest* to:
 - A. -\$309.
 - B. +\$883.
 - C. +\$1,523.
4. Fullen Machinery is investing \$400 million in new industrial equipment. The present value of the future after-tax cash flows resulting from the equipment is \$700 million. Fullen currently has 200 million shares of common stock outstanding, with a current market price of \$36 per share. Assuming that this project is new information and is independent of other expectations about the company, what is the theoretical effect of the new equipment on Fullen's stock price? The stock price will:
 - A. decrease to \$33.50.
 - B. increase to \$37.50.
 - C. increase to \$39.50.

MODULE 26.2: CAPITAL ALLOCATION PRINCIPLES AND REAL OPTIONS



Video covering this content is available online.

LOS 26.c: Describe principles of capital allocation and common capital allocation pitfalls.

Principles of Capital Allocation

The capital allocation process involves the following key principles:

- *Decisions are based on after-tax cash flows, not accounting income.* Accounting income is based on accruals and does not consider the timing of cash flows. The impact of taxes must be considered when analyzing all capital allocation projects. Firm value is based on cash flows firms get to keep, not those they send to the government. Any tax savings from non-cash tax deductions, such as depreciation and amortization, should also be included in the analysis.
- *Incremental cash flows only.* Incremental cash flows are those that change if the project is undertaken. **Sunk costs** are costs that cannot be avoided even if the project is not undertaken. Because these costs are not affected by the accept/reject decision, they should not be included in the analysis. An example of a sunk cost is a consulting fee paid to a marketing research firm to estimate demand for a new product before making a decision on the project. Project analysis should consider the cash flow impact on other parts of the business. A negative effect, called cannibalization, occurs when a new project replaces sales from an existing product. An example of cannibalization is when a soft drink company introduces a diet version of an existing beverage. A positive externality exists when doing the project would have a positive effect on sales of a firm's other product lines.
- *The timing of cash flows is important.* Capital allocation decisions account for the time value of money, which means that cash flows received earlier are worth more than cash flows to be received later.

Common mistakes managers make when evaluating capital projects have two categories: cognitive errors (calculation errors) and behavioral biases (errors of judgment).

Cognitive Errors

- *Poor forecasting.* Examples include incorrectly allocating overhead costs or neglecting to anticipate how competitors will respond to a project.
- *Not considering the cost of internal funds.* Often, the cost of internally generated funds is not accounted for (it should be same as cost of equity because those funds would have been paid as dividends if not for the project). Companies that have an aversion to paying dividends are potentially using the retained earnings to fund poor projects.
- *Incorrectly accounting for inflation.* Firms can analyze projects either in nominal or real terms. An analysis based on real cash flows must also use a real discount rate.

Behavioral Biases

- *Pet projects of senior management.* Projects that have the personal backing of influential members of senior management may contain overly optimistic

projections that make the project appear more profitable than it really is. In addition, the project might not be subjected to the same level of scrutiny as other projects.

- *Inertia in setting the entire capital budget.* Capital budgets for many companies are similar from one year to the next. This indicates anchoring of capital budgets to the prior year rather than appropriately considering what opportunities exist every year. In a company with a culture of maximizing shareholder value, managers will return excess funds to shareholders whenever there is a lack of positive NPV projects and make a case for expanding the budget when there are multiple positive NPV opportunities. Analysts should watch for companies with static or rising capital budgets coupled with declining returns as a sign of this bias.
- *Basing investment decisions on EPS or ROE.* Managers whose incentive compensation is tied to increasing EPS or ROE may avoid positive long-term NPV investments that are expected to reduce EPS or ROE in the short run.
- *Failure to generate alternative investment ideas.* Generating investment ideas is a crucial step in the capital allocation process. However, once a manager comes up with a “good” idea, he or she may go with it rather than searching for an idea that is “better.”

LOS 26.d: Describe types of real options relevant to capital investments.

Real options are future actions that a firm can take, given that they invest in a project today. Real options are similar to financial options (put and call options) in that they give the option holder the right, but not the obligation, to take a future action. The value of real options could enhance a project's NPV. Options never have negative values because if, in the future, the specified action will have a negative value, the option holder will not take the action (i.e., not exercise the option).

Types of real options include the following:

- **Timing options** allow a company to delay making an investment because it expects to have better information in the future.
- **Abandonment options** allow management to abandon a project if the present value of the incremental cash flows from exiting a project exceeds the present value of the incremental cash flows from continuing the project.
- **Expansion options** or **growth options** allow a company to make additional investments in future projects if the company decides they will create value.
- **Flexibility options** give managers choices regarding the operational aspects of a project. The two main forms are price-setting and production-flexibility options.
 - **Price-setting options** allow the company to change the price of a product. For example, the company may raise prices if demand for a product is high in order to benefit from that demand without increasing production.
 - **Production-flexibility options** may include paying workers overtime, using different materials as inputs, or producing a different variety of product.
- **Fundamental options** are projects that are options themselves because the payoffs depend on the price of an underlying asset. For example, the payoff for a

copper mine is dependent on the market price for copper. If copper prices are low, it may not make sense to open a copper mine, but if copper prices are high, opening the copper mine could be very profitable. The operator has the option to close the mine when prices are low and open it when prices are high.

One way companies can include real options in their project analysis is to estimate their value and add it to the NPV (while subtracting any extra cost to acquire the real option). This can incorporate available techniques such as option pricing models or decision trees. Another approach is to simply consider the NPV without real options to be the project's minimum value.



MODULE QUIZ 26.2

1. Which of the following statements concerning the principles underlying the capital allocation process is *most accurate*?
 - A. Cash flows should include tax benefits of non-cash expense deductions.
 - B. The net income for a project is essential for making a correct capital allocation decision.
 - C. Cash flows should be project specific, ignoring sunk costs and impacts on other parts of the business.
2. A manufacturer of clothes washing machines decides to add matching clothes dryers to its product line. In this case, it is *most likely* important in the project analysis to consider:
 - A. sunk costs.
 - B. negative impact on other parts of the business.
 - C. positive impact on other parts of the business.
3. An analyst is estimating the NPV of a project to introduce a new spicier version of its well-known barbeque sauce into its product line. A cost that should *most likely* be excluded from his analysis is:
 - A. \$200,000 to develop a recipe for the new sauce.
 - B. \$100,000 for a marketing survey that was conducted to determine demand for a spicier sauce.
 - C. a \$150,000 decrease in sales of its current sauce as some current customers switch to the spicier sauce.
4. Albert Duffy, a project manager at Crane Plastics, is considering taking on a new capital project. When presenting the project, Duffy shows members of Crane's executive management team that, because the company has the ability to have employees work overtime, the project makes sense. The project Duffy is taking on would be *best* described as having a(n):
 - A. flexibility option.
 - B. expansion option.
 - C. fundamental option.

KEY CONCEPTS

LOS 26.a

Capital investments include going concern projects to maintain a business or to reduce costs, required regulatory/compliance projects, expansion projects, and other projects that increase the size and scope of a company.

LOS 26.b

Capital allocation is the process of evaluating capital projects (i.e., projects with cash flows over a period longer than one year).

Steps of the capital allocation process are: (1) generate investment ideas; (2) analyze project ideas; (3) create a firm-wide capital budget; and (4) monitor decisions and conduct a post-audit.

NPV is the sum of the present values of a project's expected cash flows and represents the change in firm value from undertaking a project. Positive NPV projects should be undertaken, but negative NPV projects should not because they are expected to decrease the value of the firm.

An IRR is the discount rate at which the present values of a project's expected cash inflows and cash outflows are equal (i.e., the discount rate for which the NPV of a project is zero). A project for which the IRR is greater (less) than the appropriate discount rate for the project will have an NPV that is positive (negative) and should be accepted (not accepted).

Return on invested capital can be compared to a company's required rate of return to indicate whether the company has increased or decreased firm value over time.

LOS 26.c

Capital allocation decisions should be based on after-tax cash flows, ignore sunk costs, and capture any spillover effects on other parts of the business. Timing of cash flows is important.

Common mistakes in the capital allocation process include the following:

- Having overly optimistic assumptions for pet projects of senior management
- Basing long-term investment decisions on short-term EPS or ROE considerations
- Poor cash flow estimation, misestimating overhead costs, and improper accounting for inflation
- Not accounting for cost of internally generated funds in the estimate of required rate of return
- Static capital budgets without regard to actual investment opportunities
- Failure to generate alternative investment ideas

LOS 26.d

Real options allow managers to make future decisions that change the value of capital allocation decisions made today.

- Timing options allow a company to delay making an investment.
- Abandonment options allow management to abandon a project if the present value of the incremental cash flows from exiting a project exceeds the present value of the incremental cash flows from continuing a project.
- Expansion options allow a company to make additional investments in a project if doing so creates value.
- Flexibility options give managers choices regarding the operational aspects of a project. The two main forms are price-setting and production-flexibility options.
- Fundamental options are projects that are options themselves because the payoffs depend on the price of an underlying asset.

Module Quiz 26.1

1. **C** Going concern projects are those to maintain the business or to increase the efficiency of existing operations. The other two projects are business growth investments that increase the size of the company. (LOS 26.a)
2. **A** A post-audit identifies what went right and what went wrong. It is used to improve forecasting and operations. (LOS 26.b)
3. **B** $CF_0 = -5,000$; $CF_1 = 3,000$; $CF_2 = 2,000$; $CF_3 = 2,000$; $I / Y = 10$; $NPV = \$883$. (LOS 26.b)
4. **B** The NPV of the new equipment is $\$700 \text{ million} - \$400 \text{ million} = \$300 \text{ million}$. The NPV of this project is added to Fullen's current market value. On a per share basis, the addition is worth $\$300 \text{ million} / 200 \text{ million shares}$, for a net addition to the share price of $\$1.50$. $\$36.00 + \$1.50 = \$37.50$. (LOS 26.b)

Module Quiz 26.2

1. **A** Cash flows should be after-tax and include any tax savings from non-cash deductions (e.g., depreciation and amortization). While sunk costs should be ignored, the impact on other parts of the business (positive or negative) should be accounted for by adjusting cash flows. Accounting net income, which includes non-cash expenses, is irrelevant. Incremental cash flows are essential for making correct capital allocation decisions. (LOS 26.c)
2. **C** It is quite possible that offering a matching dryer will increase sales of their washers because some consumers will prefer a matching set. The increased sales of their washers is a positive impact, and those incremental profits should be considered in the analysis. A negative impact on another part of the business would be a consideration if introducing dryers could be expected to decrease washer sales. Sunk costs should not be considered in project analysis. (LOS 26.c)
3. **B** The cost of the marketing survey should not be included because it is a sunk cost; it will be incurred whether they decide to do the project or not. The decrease in sales of their current sauce if the spicier version is introduced (cannibalization) should be considered in the analysis. The cost of recipe development should be included because it will only be incurred if they decide to go ahead with the introduction of the new spicier sauce. (LOS 26.c)
4. **A** The project described has production flexibility regarding the level of production. Other flexibility options might be to produce a different product or to use different inputs at some future date. Including the value of real options can improve the NPV estimates for individual projects. (LOS 26.d)

READING 27

CAPITAL STRUCTURE

MODULE 27.1: WEIGHTED-AVERAGE COST OF CAPITAL



Video covering this content is available online.

LOS 27.a: Calculate and interpret the weighted-average cost of capital for a company.

An issuer's **weighted-average cost of capital (WACC)** is a blended rate that includes its cost of debt and equity:

$$\text{WACC} = [\text{weight of debt} \times \text{pretax cost of debt} \times (1 - \text{tax rate})] + (\text{weight of equity} \times \text{cost of equity})$$

The cost of debt is lower than the cost of equity because debt has priority of claims over equity. Because most jurisdictions allow tax deductions for corporate interest expense, we adjust the pretax cost of debt to its after-tax value in the WACC formula.

The weights for debt and equity can be target weights or market value weights. Analysts often estimate a company's target weights based on book value of debt and equity. Market value weights are appropriate for estimating the current opportunity cost of capital as they reflect current market conditions.

EXAMPLE: WACC

ABC, Inc.'s, capital structure is 50% debt and 50% equity. ABC's cost of debt is 8%, while the cost of equity is 11%. ABC's corporate tax rate is 30%. Calculate the WACC for ABC.

Answer:

$$\text{WACC} = [0.50 \times 0.08 \times (1 - 0.30)] + (0.50 \times 0.11) = 0.083, \text{ or } 8.3\%$$

LOS 27.b: Explain factors affecting capital structure and the weighted-average cost of capital.

Capital structures vary considerably among companies. Typically a company will target a capital structure that minimizes its WACC, while also considering the nature of its assets (i.e., long-lived or shorter-term) when choosing the duration of its financing sources.

We may view factors that affect capital structures as those that determine a company's capacity to service debt. These factors may be internal or external to a firm. Internal factors include the characteristics of the business or industry, a company's life cycle stage, a company's existing debt level, and the corporate tax rate. External factors include market and business cycle conditions, regulation, and industry norms.

Company characteristics that influence the proportion of debt in a company's capital structure include the following:

- *Growth and stability of revenue.* High growth of revenue or stability of significant revenue suggest a continuing ability to service debt.
- *Growth and predictability of cash flow.* Growing cash flow increases the ability to service debt. Significant and stable cash flows indicate a continuing ability to service debt.
- *Amount of business risk.* More business risk (operational risk and demand risk) means greater variability of earnings and cash flows, which decreases the ability to service debt.
- *Amount and liquidity of company assets.* Assets can be pledged as collateral to make a company's debt more attractive. When assets are more liquid (easier to turn into cash, values more stable), they can be pledged more readily.
- *Cost and availability of debt financing.* Companies find debt relatively more attractive when the cost of debt is lower and investors are more willing to lend to the company. Both of these are greater when the characteristics just listed support the issuance of debt.

In general, the more stable, predictable, and recurring are a company's revenues and cash flows, the higher proportion of debt it can have in its capital structure. With this in mind, we can say, other things equal:

- Companies in noncyclical industries are better able to support high proportions of debt than companies in cyclical industries.
- Companies with low fixed operating costs as a proportion of total costs (i.e., low operating leverage) are better able to support high proportions of debt than companies with high fixed costs.
- Companies with subscription-based revenue models are better able to support high proportions of debt than companies with pay-per-use revenue models.

The types of assets companies use to generate revenues also affect their ability to issue and service debt. For example, creditors tend to view tangible assets as better collateral than intangible assets, especially when those assets can be sold for cash, if necessary, without losing significant value (i.e., are more liquid) or are more readily substituted for similar assets (i.e., are more fungible). A company that owns its productive assets outright as opposed to using assets owned by others (such as a franchise model) has more collateral, which improves access to debt financing and reduces borrowing costs.

In addition to the types of assets, other issuer-specific conditions include the levels of existing debt and volatility of revenues and earnings. High levels of debt or high volatility of earnings indicates a lower ability to issue additional debt. Leverage (e.g.,

debt-to-equity or debt-to-operating profit) and coverage ratios (e.g., interest coverage = EBIT / interest expense) are used for analyzing debt capacity.

We can see the effects of these various factors on the debt-to-equity ratios of companies at different stages of their company's life cycle. Consider the following three stages:

1. *Start-up stage.* Sales are just beginning, and operating earnings and cash flows tend to be low or negative. Business risk is relatively high. Company debt is quite risky and, if issued, would require high interest rates. Assets, both accounts receivable and fixed assets, typically are low; therefore, they are not available as collateral for debt. For these reasons, start-up companies are financed almost exclusively with equity. In some cases, high-growth companies with rapidly rising stock prices may find it possible to issue **convertible debt**, which allows the company to use a lower-cost source of capital and avoid immediate dilution of existing shareholders' interests. Leasing assets is another source of debt financing available to companies in this stage of the life cycle.
2. *Growth stage.* Revenue and cash flow are rising, and business risk is somewhat reduced. Debt financing cost is somewhat reduced (i.e., usage is conservative), and investors may be willing to lend to the company, often with the loans secured by fixed assets or accounts receivable.
3. *Mature stage.* In this stage, revenue growth is slowing and business risk is much lower. Cash flow is significant and relatively stable. Debt financing, including unsecured debt, is widely available at a relatively low cost.

The cost of capital is also influenced by top-down factors. Top-down factors are macroeconomic factors that affect the benchmark interest rate (e.g., U.S. Treasury rate) and credit spreads to benchmark rates. These include inflation, the real GDP growth rate, monetary policy, and exchange rates. In business cycle downturns, debt investors demand greater yield spreads to benchmark bonds from corporate borrowers to compensate them for the increased risk of default. This is especially true for companies in cyclical industries. Some industries may be favorably affected by the economic environment. For example, oil industry profitability is linked to oil prices, and spreads for issuers in the industry tend to narrow when oil prices rise.



MODULE QUIZ 27.1

1. Alpaca's capital structure is 60% debt with an interest rate of 6%. Alpaca's cost of equity is 12%, and the corporate tax rate is 15%. Alpaca's WACC is *closest* to:
A. 6.3%.
B. 7.9%.
C. 9.7%.
2. A company is *most likely* to be financed only by equity during its:
A. start-up stage.
B. growth stage.
C. mature stage.

MODULE 27.2: CAPITAL STRUCTURE THEORIES



Video covering
this content is

LOS 27.c: Explain the Modigliani–Miller propositions regarding capital structure.

MM Proposition I (No Taxes): Capital Structure Irrelevance

In 1958, Nobel laureates Franco Modigliani and Merton Miller (we will refer to them as MM) published their seminal work on capital structure theory. In it, MM demonstrate that under certain assumptions, the value of a firm is unaffected by its capital structure. This result is referred to as MM I. The assumptions that lead to MM I are as follows:

- *Capital markets are perfectly competitive.* There are no transactions costs, taxes, or bankruptcy costs.
- *Investors have homogeneous expectations.* They have the same expectations with respect to cash flows generated by the firm.
- *There is riskless borrowing and lending.* Investors can borrow and lend at the risk-free rate.
- *There are no agency costs.* There are no conflicts of interest between managers and shareholders.
- *Investment decisions are unaffected by financing decisions.* Operating income is independent of how the firm is financed.

Intuitively, we can explain MM I in terms of a pie. MM I essentially concludes that the amount of pie available (value of the firm) does not depend on how it is sliced (the capital structure). The value of a firm does not change depending on how the claims to its earnings are divided. This idea is illustrated in Figure 27.1.

Figure 27.1: MM Capital Structure Irrelevance Proposition



Consider why the pie analogy holds. The operating earnings (EBIT) of a firm are available to providers of capital. In a company with no debt, all of the operating earnings are available to equity holders, and the value of the company is the discounted present value of these earnings, with a discount rate that depends on the risk of (uncertainty about) earnings. If a company is financed partly by debt and partly by equity, operating earnings are divided between debtholders and equity holders. If one entity purchased all the debt and all the equity of the firm, it would be entitled to all of the EBIT of the firm, so the total value of its holdings must equal the value of an all-equity firm—which also has a claim to all the operating earnings of the firm. Under the assumption that operating earnings are unaffected by

financing decisions, the total value of debt and equity will be unaffected by the proportions of debt and equity in a firm's capital structure.

MM Proposition II: Cost of Equity and Leverage

MM's second proposition (MM II) is framed in terms of a firm's cost of capital, rather than firm value. Based on the same assumptions as MM I, MM II states that the cost of equity increases linearly as a company increases its proportion of debt financing. The cash flows promised to bondholders have priority, so that equity holders receive the remaining cash flows after the claims of debtholders have been met. Because the cash flows promised to debtholders are more certain (less risky) than the residual cash flows promised to equity holders, the cost of debt will be less than the cost of equity. The greater the amount of debt in a firm's capital structure, the more uncertain are the residual cash flows to equity holders. MM II tells us that as companies increase the proportion of debt financing, the risk of the cash flows to equity holders increases, which increases the cost of equity.

The conclusion of MM II is that the decrease in financing costs from using a larger proportion of (lower-cost) debt is just offset by the increase in the cost of equity, resulting in no change in the firm's WACC.

Given MM II (that the value of the firm, and therefore its WACC, is unaffected by changes in the proportion of debt financing), we can state the relation that must hold between a company's debt-to-equity ratio and its cost of equity:

$$r_e = r_0 + \frac{D}{E}(r_0 - r_d)$$

where:

r_e = cost of equity

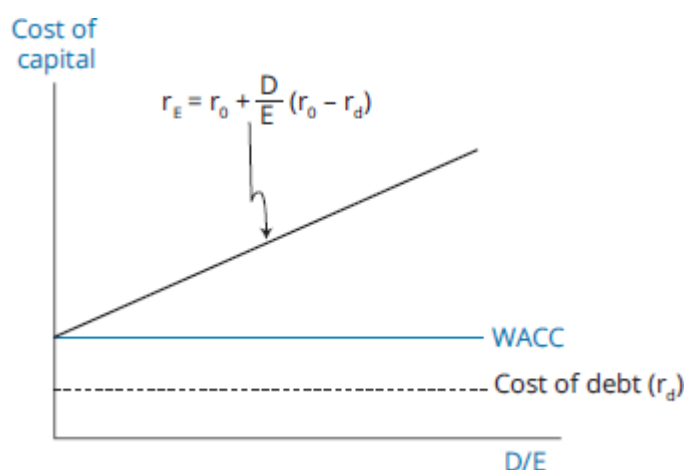
r_0 = cost of equity with no debt (all equity)

r_d = cost of debt

$\frac{D}{E}$ = debt-to-equity ratio

As leverage (the debt-to-equity ratio) increases, the cost of equity increases, but the cost of debt and WACC are unchanged. This relationship between the cost of equity financing and the debt-to-equity ratio is illustrated in Figure 27.2.

Figure 27.2: MM Proposition II (No Taxes)



MM II is consistent with MM I; if the benefits of greater use of lower-cost debt financing are just offset by the increased cost of equity, the proportions of debt versus equity in the firm's capital structure do not affect the firm's overall cost of capital or the value of the firm.

MM With Taxes: Value Is Maximized at 100% Debt

As is often done in theoretical work, MM started with several simplifying assumptions. The next step is to examine the effects of relaxing some of those assumptions. Here, we examine the MM propositions under the assumptions that earnings are taxed and that interest payments to debtholders are tax deductible. Under the tax code of most countries, interest payments are a pretax expense and are therefore tax deductible, while dividends paid to equity holders are not tax deductible.

This differential tax treatment encourages firms to use debt financing because debt provides a **tax shield** that adds value to the company. The tax shield is equal to the tax rate multiplied by the amount of debt in the capital structure. In other words, the value of a levered firm is equal to the value of an unlevered firm plus the value of the tax shield provided by debt financing.

To continue our analogy of a pie, with the introduction of taxes, the government gets a slice of the pie. When debt financing is used, the government's slice of the pie is smaller, so that the amount of pie available to debt and equity holders is greater. The use of debt reduces taxes due to deductibility of interest expense giving rise to debt tax shield. If a firm were 100% financed with debt, the taxes avoided would be at a maximum, and the after-tax cash flows of the firm (size of the pie) would be maximized. The conclusion of *MM I with taxes* is that the value of the firm is maximized with 100% debt financing.

If we assume a positive tax rate, the formula to solve for return on equity can be used to illustrate *MM II with taxes*:

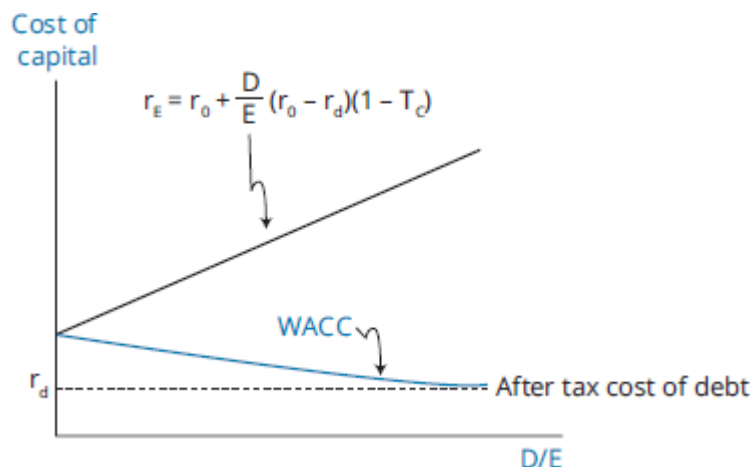
$$r_e = r_0 + \frac{D}{E}(r_0 - r_d)(1 - T_C)$$

where:

T_C = tax rate

Figure 27.3 illustrates that the tax shield provided by debt causes the WACC to decline as leverage increases. The value of the firm is maximized at the point where the WACC is minimized, which is 100% debt.

Figure 27.3: MM Proposition II (With Taxes)



In practice, we do not find that companies finance their assets with 100% debt, or close to it. MM suggested that differential investor tax rates on dividends and interest income could explain differences in capital structures.

Current theory suggests that differences in value-maximizing choices of how much financial leverage to use are the result of additional costs of using debt financing that we have not yet considered—we assumed that there are no bankruptcy costs. However, we can expect these costs, also called the **costs of financial distress**, to increase at higher levels of debt financing. Costs of financial distress are the increased costs a company faces when earnings decline to the point where the firm has trouble paying its fixed financing costs (interest on debt). The expected costs of financial distress for a firm have two components:

1. *Costs of financial distress and bankruptcy* can be direct or indirect. Direct costs of financial distress include the cash expenses associated with the bankruptcy, such as legal fees and administrative fees. Indirect costs include foregone investment opportunities and the costs that result from losing the trust of customers, creditors, suppliers, and employees. Additionally, during periods of financial distress, conflicts of interest between managers (who represent equity owners) and debtholders impose additional costs, referred to as the **agency costs of debt**.
2. *The probability of financial distress* is related to the firm's use of operating and financial leverage. In general, higher amounts of financial leverage increase the probability of financial distress (higher probability that cash flows will fall to an amount that is insufficient to make their promised debt payments). Other factors to consider include the quality of a firm's management and the company's corporate governance structure. Lower-quality management and poor corporate governance lead to a higher probability of financial distress.

Higher expected costs of financial distress tend to discourage companies from using large proportions of debt in their capital structures, all else equal. The expected costs of financial distress shrink our pie as the proportion of debt financing is increased.

LOS 27.d: Describe optimal and target capital structures.

Static Tradeoff Theory

The **static tradeoff theory** seeks to balance the costs of financial distress with the tax shield benefits from using debt. There is an amount of debt financing at which the increase in the value of the tax shield from additional borrowing is exceeded by the value reduction of higher expected costs of financial distress. This point represents the **optimal capital structure** for a firm, where the WACC is minimized and the value of the firm is maximized.

Accounting for the costs of financial distress, the expression for the value of a levered firm becomes the following:

$$V_L = V_U + (t \times \text{debt}) - \text{PV (costs of financial distress)}$$

We illustrate this relationship in Figure 27.4.

Figure 27.4: Static Tradeoff Theory: Cost of Capital vs. Capital Structure

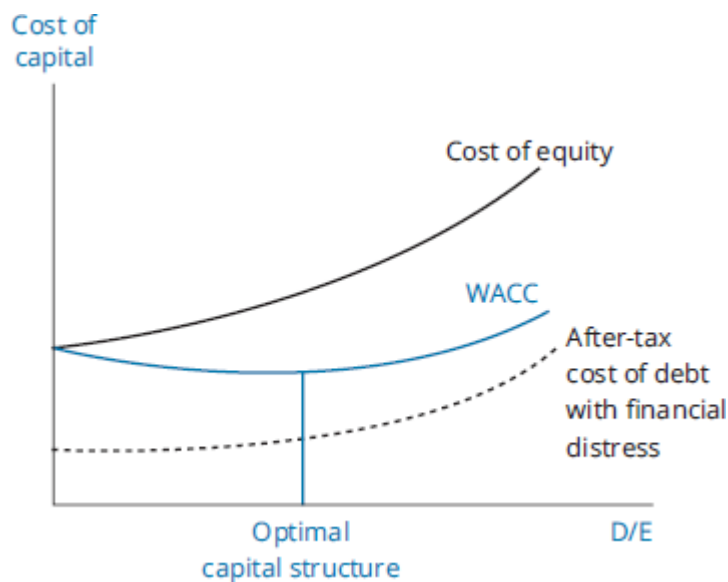
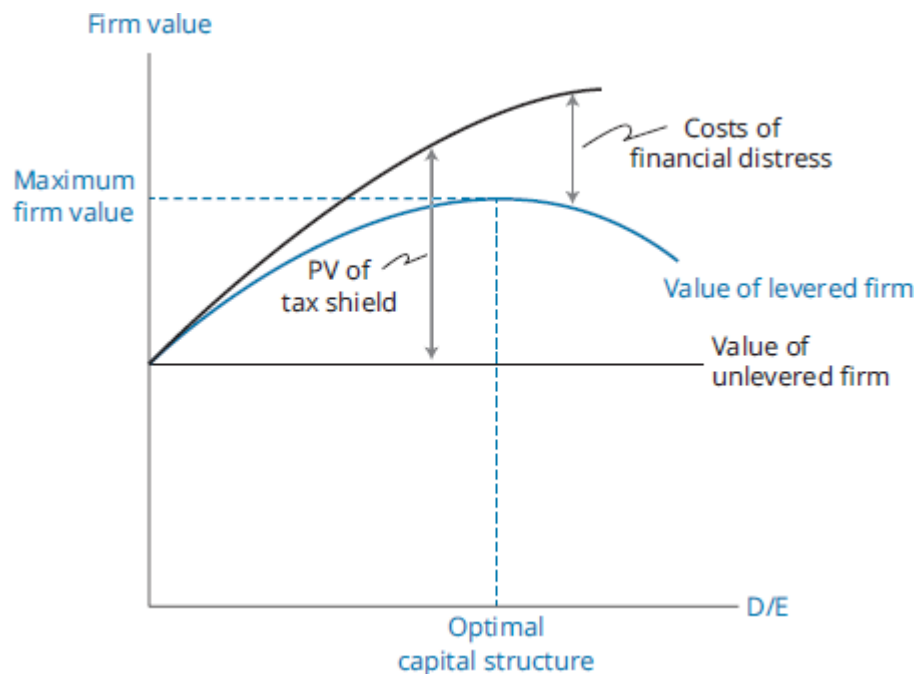


Figure 27.5 illustrates the tradeoff between firm value and capital structure. Note that each firm's optimal capital structure depends on its business risk (operating risk and sales risk), tax rate, corporate governance, industry influences, and other factors.

Figure 27.5: Static Tradeoff Theory: Firm Value vs. Capital Structure



To summarize:

- *MM's propositions with no taxes or costs of financial distress* are that a company's capital structure is irrelevant because its WACC and its value (the discounted present value of its operating earnings) are unchanged by changes in capital structure.
- *MM's propositions with taxes but without costs of financial distress* are that a company's WACC is minimized and its value is maximized with 100% debt.
- *Static tradeoff theory* indicates that firm value initially increases (and WACC decreases) with additional debt financing, but company value decreases at some point when the increase in the expected value of financial distress outweighs the tax benefits of additional debt.

Target capital structure is the capital structure that a firm seeks to achieve on average over time to maximize firm value. That is, it reflects management's beliefs about its optimal capital structure as well as other internal and external factors.

For analysis, the weights to use when estimating a firm's WACC should be based on its target capital structure, the proportions (based on market values) of debt, preferred stock, and equity that the firm expects to achieve over time. An analyst may use management's stated target proportions of equity and debt; however, most firms do not provide these.

In the absence of stated capital structure weights, an external analyst must estimate a firm's target capital structure. Alternatives for estimating target capital structure include the following:

- An analyst may simply use the firm's current capital structure (based on market values) as the best indication of its target capital structure.
- If there has been a noticeable trend in the firm's capital structure, an analyst may incorporate this trend into her estimate of the firm's target.
- An analyst may use the average capital structure weights for a firm's industry.

In contrast with independent analysts, company managers often focus on book values of debt and equity. Reasons book values may be appropriate for internal analysis include:

- Short-term fluctuations in the market values of debt and equity do not really affect a company's appropriate level of debt.
- While market values reflect the perspectives of investors in a company, management's perspective has more to do with how the company needs to deploy its capital to projects.
- Credit rating agencies use book values in their measures of credit quality. Managers may make capital structure decisions with these measures in mind.

In practice, a firm's actual capital structure tends to fluctuate around the target capital structure. Market fluctuations, especially in the market value of a firm's equity, may cause the firm's capital structure to vary from the target. Management may choose to exploit opportunities in a specific financing source. For example, a temporary rise in the firm's stock price may create a good opportunity to issue additional equity, which would result in a higher percentage of equity than the target. Also, external capital is raised in minimum-size lots; hence, adherence to precise weights may not be possible.

Costs of asymmetric information arise from the fact that managers typically have more information about a company's prospects and future performance than owners or creditors. Firms with complex products or little transparency in financial statements tend to have higher costs of asymmetric information, which result in higher required returns on both debt and equity capital.

Because shareholders and creditors are aware that asymmetric information problems exist, these investors look for management behavior that signals what knowledge or opinions management may have about the firm's prospects. For example, taking on the commitment to make fixed interest payments through debt financing sends a signal that management is confident in the firm's ability to make these payments in the future. By contrast, issuing equity is typically viewed as a negative signal that managers believe a firm's stock is overvalued. The cost of asymmetric information increases with the proportion of equity in the capital structure.

Agency costs of equity are related to conflicts of interest between managers and owners. Managers who do not have a stake in the company do not bear the costs associated with excessive compensation or taking on too much (or too little) risk. Because shareholders are aware of this conflict, they take steps to reduce these costs. The result is called the **net agency cost of equity**. Net agency costs of equity have three components:

1. *Monitoring costs* are associated with supervising management and include the expenses of reporting to shareholders and paying the board of directors. Strong corporate governance systems reduce monitoring costs.
2. *Bonding costs* relate to assuring shareholders that the managers are working in the shareholders' best interest. Examples of bonding costs include premiums for insurance to guarantee performance and implicit costs associated with noncompete agreements.

3. *Residual losses* may occur even with adequate monitoring and bonding provisions because such provisions do not provide a perfect guarantee.

According to the **free cash flow hypothesis**, the use of debt forces managers to be disciplined with regard to how they spend cash because they have less free cash flow to use for their own benefit. It follows that greater amounts of financial leverage tend to reduce agency costs.

Pecking order theory, based on asymmetric information, is related to the signals that management sends to investors through its financing choices. According to pecking order theory, managers prefer to make financing choices that are least likely to send negative signals to investors. Financing choices under pecking order theory follow a hierarchy based on visibility to investors. Internally generated capital is most preferred, debt is the next-best choice, and external equity is the least preferred financing option. Pecking order theory implies that the capital structure is a by-product of individual financing decisions.



MODULE QUIZ 27.2

1. A company's optimal capital structure:
 - A. maximizes firm value and minimizes the weighted-average cost of capital.
 - B. minimizes the interest rate on debt and maximizes expected earnings per share.
 - C. maximizes expected earnings per share and maximizes the price per share of common stock.
2. Which of the following statements regarding Modigliani and Miller's Proposition II with no taxes is *most accurate*?
 - A. A firm's cost of debt financing increases as a firm's financial leverage increases.
 - B. A firm's weighted-average cost of capital is not affected by its choice of capital structure.
 - C. A firm's cost of equity financing increases as the proportion equity in a firm's capital structure is increased.
3. To determine their target capital structures in practice, it is *least likely* that firms will:
 - A. use the book value of their debt to make financing decisions.
 - B. match the maturities of their debt issues to specific firm investments.
 - C. determine an optimal capital structure based on the expected costs of financial distress.
4. The pecking order theory of financial structure decisions:
 - A. is based on information asymmetry.
 - B. suggests that debt is the first choice for financing an investment of significant size.
 - C. suggests that debt is the riskiest and least preferred source of financing.

KEY CONCEPTS

LOS 27.a

$$WACC = [\text{weight of debt} \times \text{pretax cost of debt} \times (1 - \text{tax rate})] + (\text{weight of equity} \times \text{cost of equity})$$

LOS 27.b

Capital structures vary among companies. Internal factors that affect capital structures include the characteristics of the business, the company's existing debt level, their corporate tax rate, and the company's life cycle stage. External factors include market and business cycle conditions.

A company's ability to issue debt is greater with predictable cash flows sufficient to make required debt payments, and with liquid tangible assets that the company can pledge as collateral for debt.

New companies with few assets and negative or uncertain cash flows will use little to no debt. Growth companies with positive cash flows and decreasing business risk may use lower levels of debt. Mature companies with predictable cash flows tend to use significantly more debt.

LOS 27.c

MM's propositions with no taxes are that a company's capital structure is irrelevant, because its WACC and firm value (the discounted present value of its operating earnings) are unchanged by changes in capital structure.

MM's propositions with taxes are that a company's WACC is minimized and its value is maximized with 100% debt financing.

LOS 27.d

Static tradeoff theory adds the expected costs of financial distress to the model. It indicates that firm value initially increases (and WACC decreases) with additional debt financing, but that company value decreases at some point with additional debt as the increase in the expected costs of financial distress outweigh the increase in tax benefits from additional debt.

In practice, a company's capital structure will fluctuate around the target due to management's exploitation of market opportunities and market value fluctuations (especially of equity) over time.

Pecking order theory is based on information asymmetry between firm management and investors and suggests that management's choice of financing method signals their beliefs about firm value. The theory concludes that retained earnings are the most preferred source of funds, followed by debt financing, and then issuing new equity.

Under the free cash flow hypothesis, the agency costs of equity, which arise because management and shareholders may have conflicting interests, are reduced by increased debt issuance.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 27.1

1. **B** Weight of equity = $1 - 0.60 = 0.40$, or 40%. WACC = $[0.60 \times 0.06 \times (1 - 0.15)] + (0.4 \times 0.12) = 7.86$. (LOS 27.a)
2. **A** During the start-up stage, a firm is unlikely to have positive earnings and cash flows or significant assets that can be pledged as debt collateral, so firms in this stage are typically financed by equity only. (LOS 27.b)

Module Quiz 27.2

1. **A** The optimal capital structure minimizes the firm's WACC and maximizes the firm's value (stock price). (LOS 27.c)
2. **B** MM's Proposition II (with no taxes) states that capital structure is irrelevant because the decrease in a firm's WACC from additional debt financing is just offset by the increase in WACC from a decrease in equity financing. The cost of debt is held constant, and the cost of equity financing increases as the proportion of *debt* in the capital structure is increased. (LOS 27.c)
3. **C** While it is a useful theoretical concept, in practice, determining an optimal capital structure based on the cost savings of debt and the expected costs of financial distress is not feasible. Because debt rating companies often use book values of debt, firms often use book values of debt when choosing financing sources. It is common for firms to match debt maturities to the economic lives of specific investments. (LOS 27.d)
4. **A** Pecking order theory is based on information asymmetry and the resulting signals that different financing choices send to investors. It suggests that retained earnings are the first choice for financing an investment, and issuing new equity is the least preferred choice. (LOS 27.d)

READING 28

BUSINESS MODELS

MODULE 28.1: BUSINESS MODEL FEATURES AND TYPES



Video covering this content is available online.

LOS 28.a: Describe key features of business models.

A successful firm must provide a product or service, find customers, deliver the product or service, and make a profit. A **business model** explains how a firm either does or proposes to do this.

“How we will provide it, sell it, and make a profit” is clearly an oversimplification, but this is the essence of a business model. In practice, the answers to these questions have many facets. Here, we present a framework that incorporates some of the complexities involved. It involves answering the questions of *who*, *what*, *how*, *where*, and *how much*.

A business model should do the following:

- *Identify the firm's potential customers (who)*, how they are acquired, the cost of customer acquisition, and how the company will monitor and maintain customer satisfaction. Potential customers can be defined in innumerable ways, ranging from every consumer within a geographic area, to dog owners, to only the home country's military in the case of a weapon. This characterization of customer groups is called **segmenting**.
- *Describe the key assets and suppliers of the firm (how)*. Key assets may be, for example, a patent, software, or skilled employees. Key suppliers may be a battery manufacturer for an electric vehicle company, a lithium miner for a battery maker, or a supplier of large excavation machinery for a lithium miner.
- *Describe the firm's product or service (what)*, how it meets a need for its potential customers, and what differentiates its products from those of competitors (e.g., low price, premium quality, innovative features).
- *Explain how the firm will sell its product or service (where)*, such as online, physical location, direct mail, trade shows, or through sales representatives; whether the firm will sell directly to the buyers (**direct sales**) or use intermediaries such as wholesalers, retailers, agents, or franchisees; and how the firm will deliver its product or service. The answers to these questions comprise a firm's **channel strategy**. A strategy that includes both digital and physical channels, such as

internet sales with delivery at a physical location, is referred to as an **omnichannel strategy**.

Firms that sell to other businesses are said to be **B2B** (business to business) firms, while firms that sell to consumers are said to be **B2C** (business to consumer) firms.

- *Explain its pricing strategy (how much)* and why buyers will pay that price for its product, given the competitive landscape of the market.

Pricing Strategies

Companies with undifferentiated products, called **commodity producers**, are price takers (e.g., oil and gas, home loans). Industries with few competitors or highly differentiated products enjoy pricing power (e.g., patented drugs). Companies may be able to charge a premium price by including services or features that are valued by customers.

Price discrimination refers to setting different prices for different customers or identifiable groups of customers. Common examples are **tiered pricing** (based on volume of purchases); **dynamic pricing** (depending on the time of day or day of the week), such as peak and off-peak pricing and low-priced airline tickets for very early or very late flights; **value-based pricing** (e.g., a new drug that offers a marginally better protection compared to existing drugs); and **auction pricing** (e.g., eBay).

Pricing models for multiple products include the following:

- **Bundling**. Where multiple products are complimentary (e.g., a furnished apartment), bundling the products may be a profitable strategy.
- **Razors-and-blades**. A company may find it profitable to sell a piece of equipment for a relatively low price (low margins) and make profits by selling a consumable used with the equipment. Printers and ink cartridges, and an e-reader and e-books are common examples.
- **Add-on pricing**. Options or add-ons priced with high margins are added to the product after the purchase decision has been made. An example is the many pricey options that may be offered after a customer has decided to purchase an automobile.

Other pricing models include the following:

- **Penetration pricing**. A company offers a product at low margins or even at a loss for a period of time to grow market share and achieve greater scale of operations. Netflix followed this strategy to grow its subscriber base rapidly.
- **Freemium pricing**. Offer a product with basic functionality at no cost, but sell or unlock other functionality for a fee. Video game makers have used this strategy to encourage wide usage and then profit on sales of greater functionality (e.g., upgraded weapons).
- **Hidden revenue**. Online content may be “free” but generate revenue through ads. For example, an internet search is free to the user while the search engine's revenue comes from selling user data.

Models that offer alternatives to outright purchases include the following:

- **Subscription model.** Microsoft's model for software has changed from selling the software to a subscription (paying monthly for access) to their Office suite of software.
- **Licensing and franchising.** For a biotech company that has developed a new and effective drug, it may be most profitable to license the production of the drug to an established drug maker with a large sales force and established distribution channels, rather than developing those resources itself for the single drug. A franchisee typically is permitted to sell in a specific area and pays a percentage of sales to the franchisor, which provides some level of product and marketing support.

Value Proposition and Value Chain

A firm's **value proposition** refers to how customers will value the characteristics of the product or service, given the competing products and their prices. How the firm executes its value proposition is referred to as its **value chain**. A firm's value chain comprises the assets of the firm and how its organization will add value and exploit the firm's competitive advantage. The value chain encompasses the quality of the product, its functionality, service that is included, the sale process, and pricing relative to the competition.

In his 1985 book *Competitive Advantage*, Michael Porter presents five activities (value chain analysis) in which firms should strive to execute well:

1. Inbound logistics
2. Operations
3. Outbound logistics
4. Marketing
5. Sales and service

LOS 28.b: Describe various types of business models.

Conventional business models tend to be industry-specific. Examples include those followed by natural resource producers, manufacturers, distributors, retailers, banks, brokers, service providers, and software. Other business models include the following:

- *Private label manufacturers or contract manufacturers.* Companies produce products for others to market under their own brand name (e.g., Costco's Kirkland-branded products).
- *Licensing agreements.* A company brand is used by another company on its products for a fee, such as a lunch box branded with a Marvel character.
- *Value-added resellers.* They offer such things as installation, service, support, or customization for complex equipment.

Innovations in business models often occur due to new entrants sometimes bringing new technology into the industry to challenge the incumbents. Examples include

pricing of software as a service (SaaS), ultra-low-cost airlines, and discount brokers.

Network effects refer to the increase in the value of a network as its user base grows. Examples of this include WhatsApp, eBay, and Facebook. Network effects support an initial strategy of penetration pricing. Network effects capitalize on both size and scope. Some networks are two-sided or multi-sided such as Airbnb, which has a multitude of hosts and guests.

Crowdsourcing models benefit from user contributions' content in the case of Wikipedia, traffic conditions and events in the case of Waze, and product improvements or new applications in the case of open-source software.



MODULE QUIZ 28.1

1. A business model is *least likely* to include details about a company's:
 - A. largest customers.
 - B. workforce characteristics.
 - C. revenue and expense estimates.
2. A pricing strategy of offering a basic product at no cost, and unlocking other functionality for a fee, is *most accurately* called:
 - A. optional products.
 - B. freemium pricing.
 - C. subscription pricing.
3. A start-up business provides consumers with professional chefs at home. For its business model to work, the company needs a sufficient number of chefs available to their customers when they have a need. Similarly, sufficient demand from customers is needed to keep the chefs interested in making themselves available. Which of the following is the company's business model *most likely* reliant on?
 - A. Licensing.
 - B. Bundling.
 - C. Network effects.

KEY CONCEPTS

LOS 28.a

A business model should identify a firm's potential customers, describe its products or services and explain how it will sell them, describe its key assets and suppliers, and explain its pricing strategy.

A value proposition refers to how a firm's customers will value the characteristics of the product or service. A value chain refers to how a firm executes its value proposition.

LOS 28.b

Apart from industry-specific conventional business models, other business models include private label manufacturers, value-added resellers, and licensing agreements.

ANSWER KEY FOR MODULE QUIZZES

Module Quiz 28.1

1. **C** Detailed forecasts of revenue in expenses would be in a financial plan, but typically not in a business model. A firm's largest customers and information about its workforce and its value are likely elements of a business model. (LOS 28.a)
2. **B** Freemium pricing offers a product with basic functionality at no cost, but sells or unlocks other functionality for a fee. Optional products involve selling additional products after a purchase decision is made. (LOS 28.a)
3. **C** Network effects refer to the increase in the value of the business as its user base grows. In this instance, the network is two-sided; a sufficient number of customers and service providers are needed for the business to succeed. (LOS 28.b)

Topic Quiz: Corporate Issuers

You have now finished the Corporate Issuers topic section. Please log into your Schweser online dashboard and take the Topic Quiz on this section. The Topic Quiz provides immediate feedback on how effective your study has been for this material. Questions are more exam-like than typical Module Quiz or QBank questions; a score of less than 70% indicates that your study likely needs improvement. These tests are best taken timed; allow 1.5 minutes per question.

FORMULAS

Portfolio Management (Part One)

Standard deviation of a two-asset portfolio:

$$\sigma_{\text{portfolio}} = \sqrt{W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B \rho_{AB} \sigma_A \sigma_B}$$

Standard deviation of returns from historical data:

$$s^2 = \frac{\sum_{t=1}^T (R_t - \bar{R})^2}{T - 1}$$

where T = number of observations

Covariance of returns from historical data:

$$\text{Cov}_{1,2} = \frac{\sum_{t=1}^n \{ [R_{t,1} - \bar{R}_1] [R_{t,2} - \bar{R}_2] \}}{n - 1}$$

where:

$R_{t,1}$ = return on Asset 1 in period t

$R_{t,2}$ = return on Asset 2 in period t

\bar{R}_1 = mean return on Asset 1

\bar{R}_2 = mean return on Asset 2

n = number of periods

Correlation:

$$\rho_{1,2} = \frac{\text{Cov}_{1,2}}{\sigma_1 \sigma_2}$$

Beta of Asset i with the market:

$$\beta_i = \frac{[\text{Cov}(R_i, R_m)]}{\sigma_m^2} = \rho_{im} \left(\frac{\sigma_i}{\sigma_m} \right)$$

where $[\text{Cov}(R_i, R_m)]$ and $\rho_{i,m}$ are the covariance and correlation between the asset and the market, and σ_i and σ_m are the standard deviations of asset returns and market returns.

Capital Asset Pricing Model (CAPM):

$$E(R_i) - R_f = \beta_i [E(R_m) - R_f]$$

$$\text{Sharpe ratio} = \left(\frac{R_P - R_f}{\sigma_P} \right)$$

$$M^2 = R_f + \frac{\sigma_M}{\sigma_P} [R_P - R_f]$$

$$\text{Treynor measure} = \frac{R_P - R_f}{\beta_P}$$

$$\text{Jensen's alpha} = \alpha_P = R_P - [R_f + \beta_P (R_M - R_f)]$$

Corporate Issuers

cash conversion cycle = days of inventory on hand + days sales outstanding
 – days payables outstanding

$$\text{Cost of supplier financing} = \left(1 + \frac{a}{1-a}\right)^{\left(\frac{365}{c-b}\right)} - 1$$

where:

a = percent discount

b = days until discount expires

c = days until full payment is due

total working capital = current assets – current liabilities

net working capital = current assets (except cash and marketable securities)
 – current liabilities (excluding short-term and current debt)

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

$$\text{quick ratio} = \frac{(\text{cash and marketable securities} + \text{accounts receivable})}{\text{current liabilities}}$$

$$\text{cash ratio} = \frac{\text{cash and marketable securities}}{\text{current liabilities}}$$

Net present value (NPV):

$$\text{NPV} = \text{CF}_0 + \frac{\text{CF}_1}{(1+k)^1} + \frac{\text{CF}_2}{(1+k)^2} + \dots + \frac{\text{CF}_n}{(1+k)^n} = \sum_{t=0}^n \frac{\text{CF}_t}{(1+k)^t}$$

where:

CF_0 = initial investment outlay

CF_t = after-tax cash flow at time t

k = required rate of return

$$\text{return on invested capital} = \frac{\text{net operating profit after tax}}{\text{average book value of total capital}}$$

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